ORDER NO. HAD8703025A9

Service Manual

Compact Disc Player

SL-P220

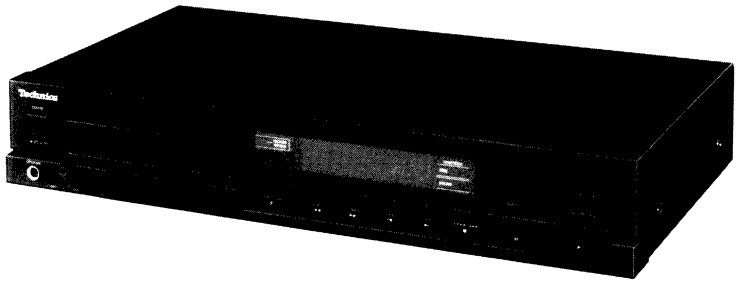
COMPACT disc DIGITAL AUDIO

DIGITAL

Compact Disc Player

Color

(K) .... Black Type



Color	Areas
(K)	[E] ..... Switzerland and Scandinavia.
(K)	[EK] .... United Kingdom.
(K)	[XL] .... Australia.
(K)	[EG] ... F.R. Germany.
(K)	[EB] .... Belgium.
(K)	[EH] .... Holland.
(K)	[EF] .... France.
(K)	[Ei] ..... Italy.
(K)	[XA] .... Asia, Latin America, Middle Near East, Africa and Oceania.
(K)	[XB] .... Saudi Arabia.
(K)	[PA] .... East PX.
(K)	[PE] .... European Military.
(K)	[PC] .... European Audio Club.

Please use this manual together with the service manual for Model No. SL-P320, Order No. HAD8702603C0.

Notes: ★ Mentioned in this service manual is the differences from Model No. SL-P320 for each area.
★ Please note the following major defference when servicing.
• This product is not provided with the numeric switches on the operation P.C.B.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Panasonic Tokyo Office
Matsushita Electric Trading Co., Ltd.
6th Floor, World Trade Center Bldg.,
No. 4-1, Hamamatsu-cho 2-Chome, Minato-ku,
Tokyo 105, Japan

CHANGES

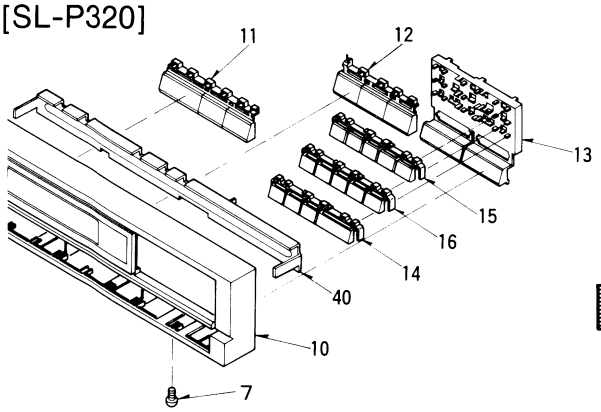
■ REPLACEMENT PARTS LIST

Note: Mentioned in this parts list are only those parts different from Model No. SL-P320 for each destination. Other parts are the same as for Model No. SL-P320 for each destination.

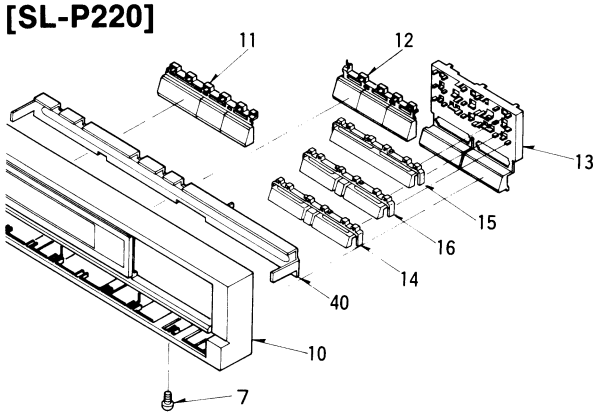
Ref. No.	Change of Part No. SL-P320 (K) → SL-P220 (K)		Part Name & Description
[INTEGRATED CIRCUITS]			
IC801	SVIPCM54JP	**SVIPCM54HP**	I.C., D/A CONVERTER
[CABINET AND CHASSIS]			
9 (E)	SGPLP320-KE	**SGPLP220-KE**	CHASSIS
(EB, EH, EF, Ei)	SGPLP320-KEB	**SGPLP220-KEB**	CHASSIS
(EG)	SGPLP320-KEG	**SGPLP220-KEG**	CHASSIS
(EK)	SGPLP320-KEK	**SGPLP220-KEK**	CHASSIS
(PA, PE, PC)	SGPLP320-KPA	**SGPLP220-KPA**	CHASSIS
(XA)	SGPLP320-KXA	**SGPLP220-KXA**	CHASSIS
(XB)	SGPLP320-KXB	**SGPLP220-KXB**	CHASSIS
(XL)	SGPLP320-KXL	**SGPLP220-KXL**	CHASSIS
10	SGYLP320-KM	**SGYLP220-KM**	FRONT PANEL ASS'Y
14	SBCD4620ZK0B	**SBCD4630ZK0C**	BUTTON MEMORY
15	SBCD4610ZK0C	**SGXD3070ZK0B**	KNOB HEADPHONES
16	SBCD4610ZK0D	**SBCD4630ZK0D**	BUTTON TIME
[PACKINGS]			
P1 (EF)	SPND204	**SPND217**	CARTON BOX
P1 (others)	SPND202	**SPND215**	CARTON BOX
[ACCESSORIES]			
A1 (XL, XA)	SQUD212	**SQUD236**	INSTRUCTION MANUAL
(EG)	SQUD214	**SQUD238**	INSTRUCTION MANUAL
(EF)	SQUD215	**SQUD239**	INSTRUCTION MANUAL
(Ei)	SQUD216	**SQUD240**	INSTRUCTION MANUAL
(EK)	SQUD217	**SQUD241**	INSTRUCTION MANUAL
(E, EB, EH)	SQULP320-KE	**SQULP220-KE**	INSTRUCTION MANUAL
(PA, PE, PC)	SQULP320-KPA	**SQULP220-KPA**	INSTRUCTION MANUAL
(XB)	SQULP320-KXB	**SQULP220-KXB**	INSTRUCTION MANUAL
[SWITCHES]			
S411 ~ 420	EVQQS405K	——	PROGRAM SWITCH

■ EXPLODED VIEWS

[SL-P320]



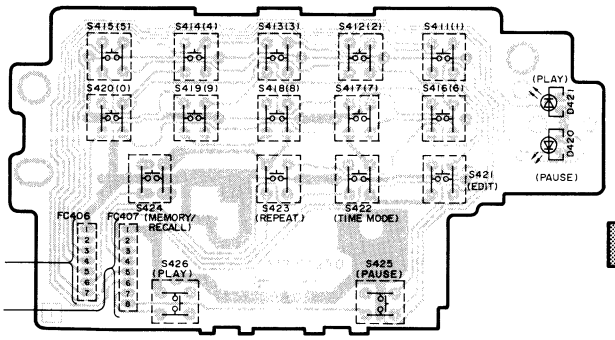
[SL-P220]



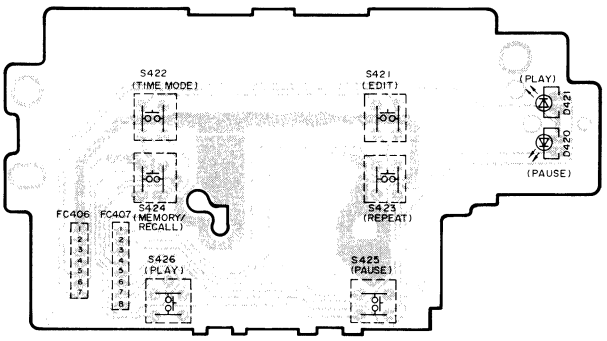
■ PRINTED CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

- **OPERATION P.C.B.**

[SL-P320]

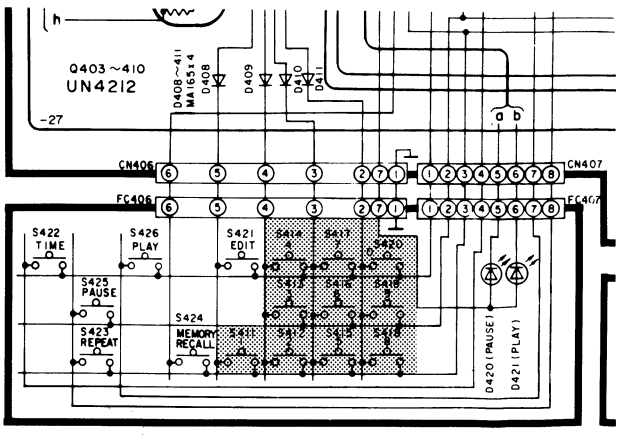


[SL-P220]



■ SCHEMATIC DIAGRAM

Note: This product is not provided with the numeric switches in the shaded area.



Printed in Japan
870309900ⓈTK/HS

ORDER NO. HAD8702603C0
A6

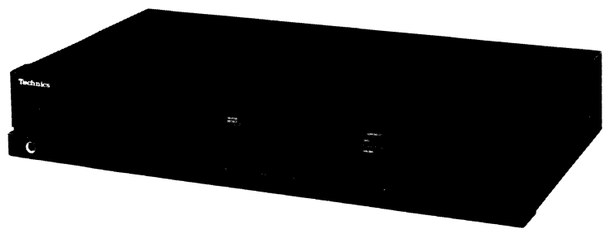
Service Manual

Compact Disc Player

COMPACT disc DIGITAL AUDIO

DIGITAL

Compact Disc Player



Color

(K).....Black Type

Area

Color	Area
(K)	(M).....U.S.A.
(K)	(MC).....Canada.
(K)	(E).....Switzerland and Scandinavia.
(K)	(Ei).....Italy.
(K)	(EG).....F.R.Germany.
(K)	(EB).....Belgium.
(K)	(EK).....United Kingdom.
(K)	(EF).....France.
(K)	(EH).....Holland.
(K)	(XL).....Australia.
(K)	(XA).....Southeast Asia, Oceania,Afirca. Middle Near East and Central South America.
(K)	(PA).....Far East PX.
(K)	(PE).....European Military.
(K)	(PC).....European Audio Club.
(K)	(XB).....Saudi Arabia.

SPECIFICATIONS

■ Audio

Number of channels: 2 (left and right,stereo)
Frequency response: 2-20,000 Hz (EIAJ)
Dynamic range: More than 96dB (EIAJ)
S/N ratio: More than 96dB (EIAJ)
Harmonic distortion: 0.002% (1kHz,0dB)
Total harmonic distortion: 0.004% (1kHz,0dB) (EIAJ)
Channel separation: More than 96dB (EIAJ)
Wow and flutter: Below measurable limit
Low-pass filter: High-resolution digital filter

■ Signal Format

Sampling frequency: 44.1kHz
Correction system: Technics Super Decoding Algorithm
D-A conversion: 16-bit linear

■ Pickup

Access time: 1 second (access to the last track)
Light source: Semiconductor laser
Wavelength: 780nm
Traverse system: High-speed linear access system

■ Functions

Automatic play: All tracks
Direct access play: Track number
Repeat play: Entire disc or programmed tracks
Search: Forward/backward track skip
Forward/backward manual search
Program play: For up to 20 selections
Preset edit play: Up to 99 minutes (for program play)
Display: Total tracks (up to 99)
Programmed
Current track
Time display (min.,sec./dB)
Time modes display
Indicators: Music matrix (20)
Overflow indicator
Disc indicator
Edit indicator
Repeat indicator
Level indicator
(When using remote control unit)
Play indicator
Pause indicator
Disc loading: Motor-driven horizontal type
Headphone output level: 15mW max. 32Ω(variable)
Plug: 1/4 inch stereo

■ General

Power supply: For U.S.A. and Canada: AC120V,60Hz
For United Kingdom and Australia: AC240V,50Hz
For Continental Europe: AC220V,50Hz
For Others: AC110~127V/220~240V,50/60Hz
Power consumption: 12W
Output voltage: 2V (at 0dB) (EIAJ)
Output impedance: Approx. 600Ω
Load impedance: More than 10kΩ
Dimensions(WxDxH) 43 X 24.4 X 8 cm (16-15/16" X 9-19/32" X 3-5/32") <When disc holder is opened: 37.2 cm (14-21/32") (D)>
Weight: 3.1kg (6.8lbs.)

■ Infrared remote control unit

Dimensions(WxDxH) 6.5 X 15.5 X 1.8 cm
Batteries: UM-3 "AA" batteries or IEC R6 or equivalent (1.5V X 2)
Weight: 140g (including batteries)

Specifications are subject to change without notice.
Weight and dimensions are approximate.
Measured by EIAJ (CP-307)

Technics

Matsushita Services Company
50 Meadowland Parkway,
Secaucus, New Jersey 07094

Panasonic Sales Company, Division of Matsushita Electric of Puerto Rico, Inc.
Ave. 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

Panasonic Hawaii, Inc.
91-238, Kauhi St. Ewa Beach
P.O. Box 774
Honolulu, Hawaii 96808-0774

Matsushita Electric of Canada Limited
5770 Ambler Drive, Mississauga,
Ontario, L4W 2T3

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Panasonic Tokyo Office
Matsushita Electric Trading Co., Ltd.
6th Floor, world Trade Center Bldg.,
No. 4-1, Hamamatsu-chó 2-Chome,
Minato-ku, Tokyo 105, Japan

■ CONTENTS

	Page
SAFETY PRECAUTION	2
PRECAUTION OF LASER DIODE	3
BEFORE USING THIS UNIT	3
LOCATION OF CONTROLS	4
HANDLING PRECAUTIONS FOR OPTICAL PICKUP	7
DISASSEMBLY INSTRUCTIONS	8
HOW TO REPLACE IC'S(Small outline type)	11
MEASUREMENTS AND ADJUSTMENTS	12
TERMINAL FUNCTION OF LSI	18
RESISTORS AND CAPACITORS	22
REPLACEMENT PARTS LIST	23
EXPLODED VIEWS	26
PRINTED CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM	29
INTERNAL CONNECTION OF FL	32
TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES	33
SCHEMATIC DIAGRAM	33
BLOCK DIAGRAM	39

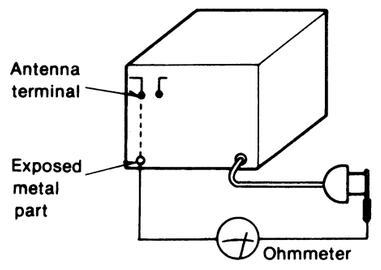
■ SAFETY PRECAUTION (This "safety precaution" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

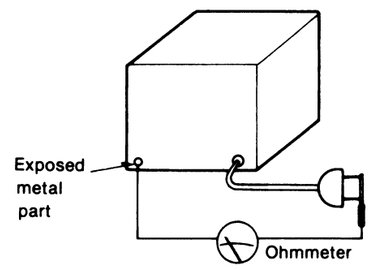
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ



(Fig. B)

Resistance = Approx ∞

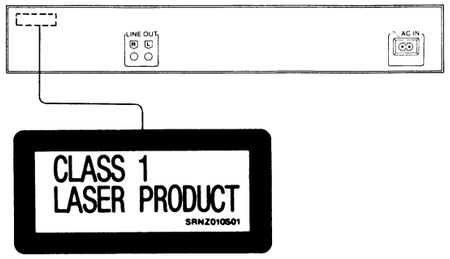
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ PRECAUTION OF LASER DIODE

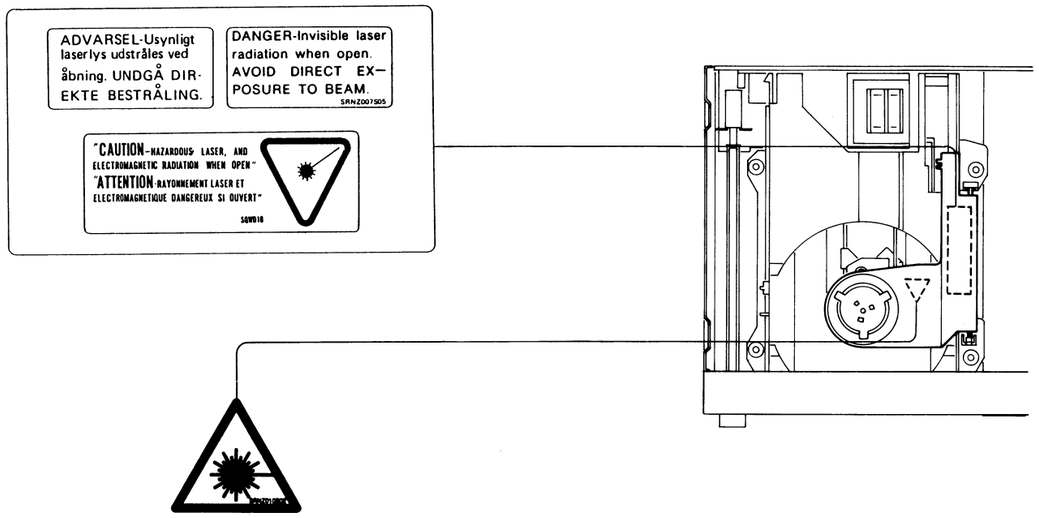
Caution: This product utilizes a laser diode.
ADVARSEL: I dette a apparat anvendes laser.

- **Use of caution labels** Note: ○ Mark is used, × Mark is not used.

Areas	SRNZ007S05	SQWD10	SRNZ010S01	SRNZ010S02
[M]	○	×	×	×
[MC]	×	○	×	×
[E]	○	×	○	○
[EK], [XL], [EG], [EB], [EH], [EF], [Ei], [XB], [XA]	○	×	○	○



Obs:
Apparaten innehåller laser
Komponent av höger laserklass
än klass 1.

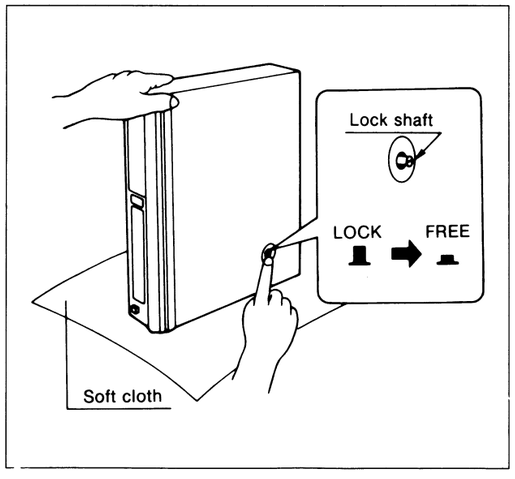

ADVARSEL-Usynligt laserlys udstråles ved åbning. UNDGÅ DIREKTE BESTRÅLING.
DANGER-Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
SRNZ007S05
"CAUTION-HAZARDOUS LASER, AND ELECTROMAGNETIC RADIATION WHEN OPEN"
"ATTENTION-RAYONNEMENT LASER ET ELECTROMAGNETIQUE DANGEREUX SI OUVERT"
SQWD10

VAROITUS! Laite sisältää laserdiodin,
joka lähettää näkymätöntä silmille
vaarallista lasersäteilya

■ BEFORE USING THIS UNIT

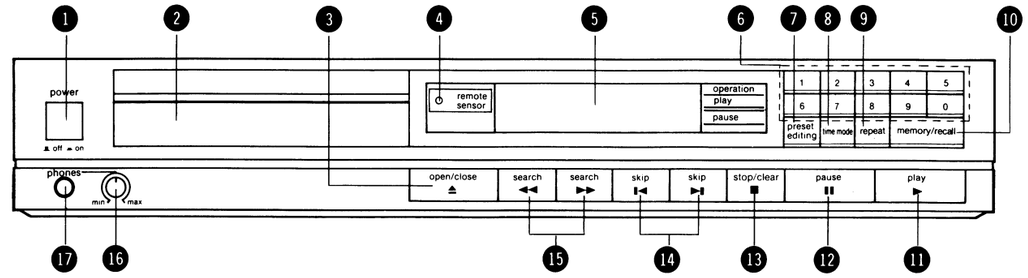
1. Place a soft cloth under the unit to protect it from scratches.
2. Press the lock shaft on the bottom panel to the in (FREE) position (▲→▬).

NOTE:
IF THE UNIT IS TRANSPORTED AGAIN, PERFORM THE FOLLOWING STEPS:
1) Remove the disc from the holder.
2) Pull the lock shaft to the out (LOCK) position (▬→▲).
CAUTION:
Do not transport the unit without locking the lock shaft.
SEVERE DAMAGE WILL RESULT.



■ LOCATION OF CONTROLS

Front panel



❶ Power switch
Press (▲→▬) to switch power on and press again (▬→▲) to switch power off.

❷ Disc holder
The disc is inserted in this holder with the label side up.

❸ Open/close button
Press this button to open and close the disc holder.

❹ Remote control sensor
Receives signals from the infrared remote control unit.

❺ Display panel
See next page.

❻ Numeric buttons (1 ~ 0)
Use these buttons to specify track numbers and preset edit time.

❼ Preset editing button
Press this button to specify the playing time (min/sec.).

❽ Time mode select button
Use this button to select the desired time display mode.

① Disc remaining playing time.
② Track number and remaining playing time of the current track.
③ Playing time from the beginning of the first track.
④ Track number and elapsed playing time from the beginning of the current track.

❾ Repeat button
This button activates repeat play mode.
Press this button to activate the repeat mode. (The repeat indicator illuminates.)
Press again to cancel the repeat mode.

❿ Memory/recall button
This button is used for the following three operations.

1. To program track numbers before starting play **(program play)**.
   (A maximum of 20 selections can be programmed.)
2. To display programmed track numbers during program play **(program confirmation)**.
3. To enter preset editing time into memory.

⓫ Play button
Press this button to begin disc play.

⓬ Pause button
Press this button to briefly stop play.
To continue play, press the play button.

Pause mode:
Play is stopped, but the pickup remains where it was at the time when the pause button was pressed. The disc rotates while the unit is in the pause mode.

Pickup:
The pickup is a laser device that reads the information on the disc surface. The pickup moves across the disc as the disc is played, but it is not visible from outside the cabinet.

⓭ Stop/clear button
Press this button to stop play and/or cancel all previous program settings.
When this button is pressed, the unit returns to the stop mode.

Stop mode:
In the stop mode, the pickup is at the beginning of the first track and the display shows the total number of tracks and total playing time of the disc.
(The disc does not rotate.)

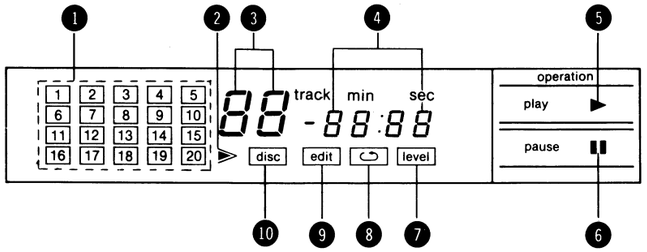
⓮ Backward and forward skip buttons
Use these buttons to move the pickup to the beginning of the forward or backward track (forward and backward skip play function).

⓯ Backward and forward search buttons
Use these buttons to move the pickup forward and backwards (manual search play function).

⓰ Phones level control knob
Use to control the output level to the headphones.

⓱ Headphones jack
Connect the optional headphones plug to this jack.
When listening to music with stereo headphones, avoid listening for prolonged periods of time. Hearing experts advise against continuous extended play.

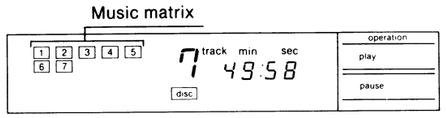
Display panel



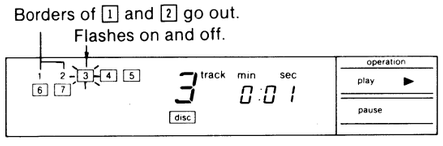
❶ Music matrix (□)

The music matrix has the following three display modes.

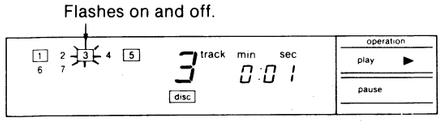
1. **When a disc is loaded, this music matrix shows the total number of tracks (up to 20 tracks).**
   For example, the music matrix below shows that the disc has 7 tracks.



2. **If a track number is specified and then play is started.**
   The specified track number is displayed and then play begins. The border around the track number currently being played flashes on and off. For example, if track 3 is specified, the display appears as shown below at the beginning of the track.
   For example, the diagram below shows that play is to begin from track 3.



3. **If track numbers are programmed and then play is started.**
   For example, if tracks 5, 3 and 1 are programmed in that order, the borders of those three track numbers illuminate and the border of the track being played flashes on and off.



❷ Overflow indicator (⩥)

⩥ Illuminates when a disc containing more than 20 tracks is inserted.

> Flashes on and off when track number 21 or higher is played.
(At this time, the illuminated borders around the numbers in the music matrix go out.)

❸ Track number display (track)

Track numbers (up to 99) are shown here.

❹ Time display (min. sec.)

- During play, the current track number and track elapsed playing time is shown.
- Each time the time mode select button is pressed during play, this display changes to show one of four time modes.
- If the memory/recall button is pressed during program play, the programmed order is shown on the sec. display.
- The digital attenuation level (dB) is also displayed here, when using the remote control unit.

❺ Play indicator (▶)

Illuminates when the play mode is activated and goes out when play is stopped.

❻ Pause indicator (▮▮)

Illuminates when the pause mode is activated and goes out when the pause mode is cancelled.

❼ Level indicator (level)

Illuminates when the output level is decreased by operating the remote control unit. Goes out when the level is returned to 0 dB.

❽ Repeat indicator (⟲)

Illuminates when the repeat mode is activated and goes out when the repeat button is pressed once again.

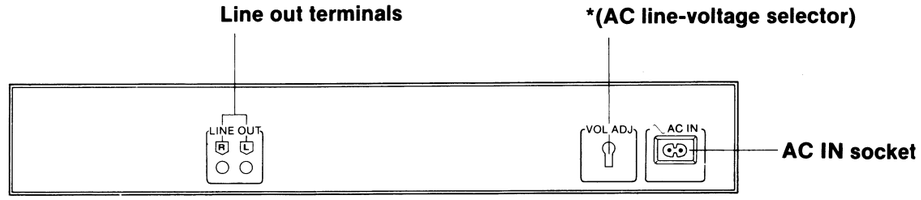
❾ Edit indicator (edit)

Illuminates when the preset editing button is pressed, and goes out when it is pressed again.

❿ Disc indicator (disc)

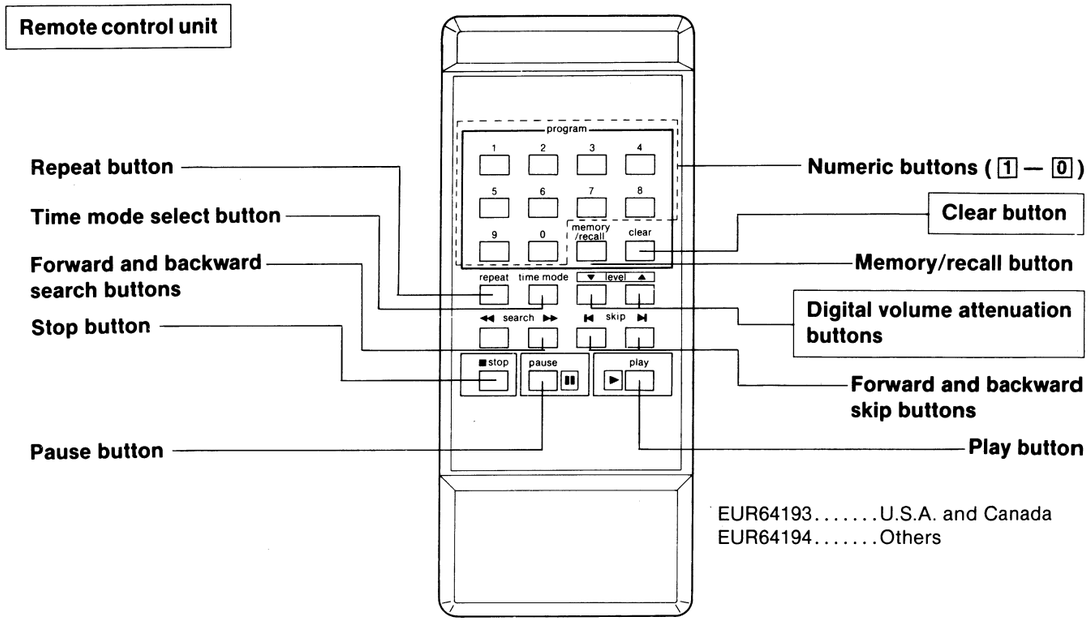
Flashes on and off when the disc holder is opening or closing.
Illuminates when a disc is in the holder (if power is on) and the disc holder is closed.

Rear panel



*Only the product for [XA], [XB], [PA], [PE] and [PC] areas is provided with the AC line-voltage selector.

Remote control unit



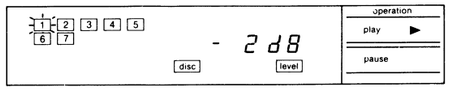
EUR64193.....U.S.A. and Canada
EUR64194.....Others

When using the remote control unit, press the buttons slowly and accurately to avoid incorrect operation.

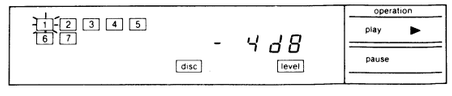
Digital volume attenuation function

- Each time the ▽ button or △ button is pressed, the display mode changes to the attenuation mode (dB display). The current digital volume level setting is displayed momentarily in the time display.
  Pressing one of these buttons again while the dB display is illuminated will cause a volume level change as described below.
- To lower the volume level press the ▽ button. The volume level can be lowered to −12 dB in 2 dB steps.

For example, when the ▽ button is pressed once:



When the ▽ button is pressed again:



- Press the △ button to return to 0 dB in 2 dB steps.
- After the dB display has gone out, the playing time is shown again.
- Volume attenuation is also returned to 0 dB automatically when power is switched off.

Note: Headphone level is also affected.

Program clear function

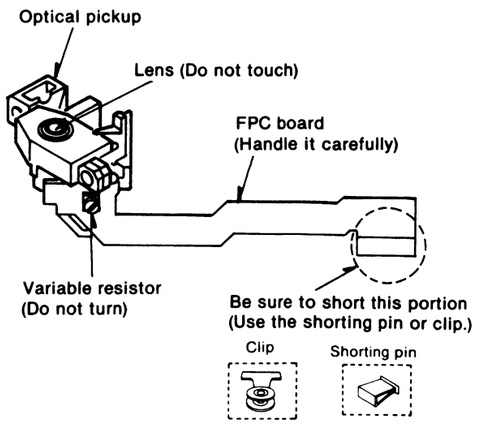
- If you make a mistake when entering a track number, press the clear button to cancel that entry. Each time this button is pressed, the previous entry is cleared.
- During play, however, the entire program is cleared when this button is pressed.
  (Preset edit play is also cancelled.)

■ HANDLING PRECAUTIONS FOR OPTICAL PICKUP

The laser diode in the optical pickup may break down due to potential difference caused by static electricity of clothes or human body.
So, be careful of electrostatic breakdown during repair of the optical pickup.

• Handling of optical pickup

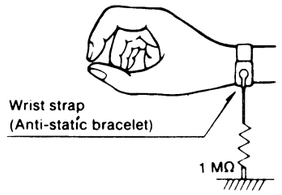
1. Do not give excessive shock to the optical pickup because it is of extremely precise structure.
2. To prevent the breakdown of the laser diode, an anti-static shorting pin is inserted into the flexible board. **(FPC board)**
   When removing or connecting the short pin, finish the job in as short time as possible.
3. Take care not to apply excessive stress to the flexible board. **(FPC board)**
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

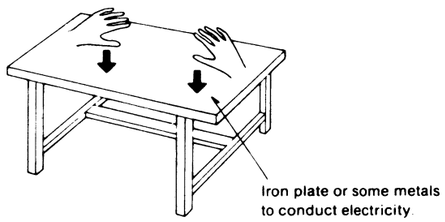


• Grounding for electrostatic breakdown prevention

1. Human body grounding
   Use the anti-static wrist strap to relieve the static electricity from your body.
2. Work table grounding
   Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

Caution:
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the optical pickup.

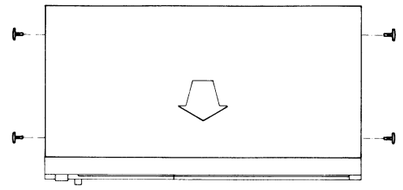




■ DISASSEMBLY INSTRUCTIONS

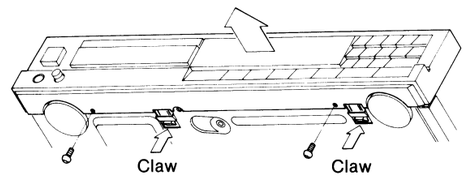
CAUTION:
- It is very dangerous to look at or touch laser radiation. (Laser radiation is invisible.)
- With the unit turned "on", laser radiation is emitted from the pickup lens.
- When doing the job, removing the cabinet and disc clamper of this unit, be sure to turn the power supply off.

Ref. No. 1	How to remove the cabinet
Procedure 1	• Remove the 4 screws.

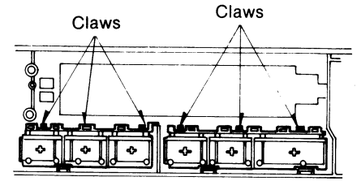


Note: When doing the job, lock the lock shaft at the bottom of the unit. (See page 3.)

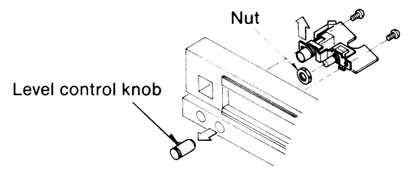
Ref. No. 2	How to remove the front panel
Procedure 1 ➧ 2	1. Remove the 2 screws. 2. Release the 2 claws at the bottom of the front panel. 3. Remove in the direction of the arrow.



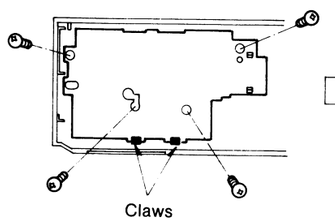
Ref. No. 3	How to remove the operation buttons
Procedure 1 ➧ 2 ➧ 3	• Release the 6 claws.

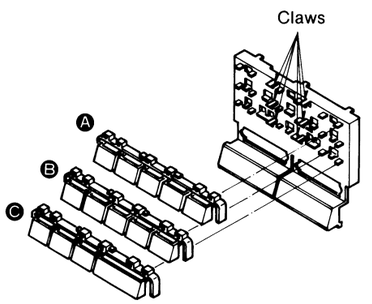


Ref. No. 4	How to remove the headphones P.C.B.
Procedure 1 ➧ 2 ➧ 4	1. Pull off the level control knob. 2. Remove the 2 screws. 3. To remove the bracket, loosen the nut and remove it in the direction of the arrow.



Ref. No. 5	How to remove the operation P.C.B.
Procedure 1 ➧ 2 ➧ 5	1. Remove the 4 screws. 2. Release the 2 claws.



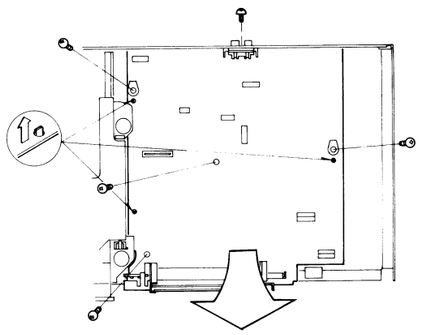


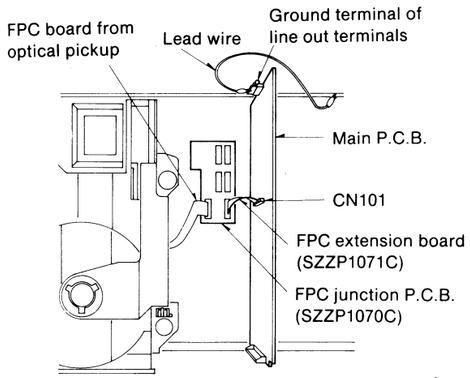
How to remove the numeric buttons
1. Release the 2 claws for the button Ⓐ and remove it.
2. Remove the button Ⓑ in the same way, then button Ⓒ.

Ref. No. 6 — How to remove the main P.C.B.

Procedure 1 ➧ 2 ➧ 7

1. Remove the 5 screws.
2. Lift up the P.C.B. to remove it from the chassis tabs.
3. Remove in the direction of the arrow.

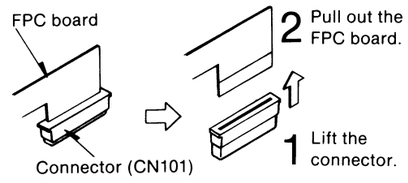




How to check the main P.C.B.

- When checking the soldered surface of the main P.C.B. and replacing the parts, do as shown.

1. Remove the main P.C.B.
2. Remove the FPC board (CN101).



Caution: Insert the short pin into the FPC board in order to prevent breakdown of laser diode. (See page 7.)

3. Connect FPC board from optical pickup to FPC junction P.C.B. (SZZP1070C).

Caution: Cover the foil of the FPC junction P.C.B. with friction tape to prevent a short-circuit between the foil and the chassis.

4. Connect FPC extension board (SZZP1071C) to FPC junction P.C.B. and CN101 of main P.C.B.
5. Place the main P.C.B. as shown in the figure.

Cautions:

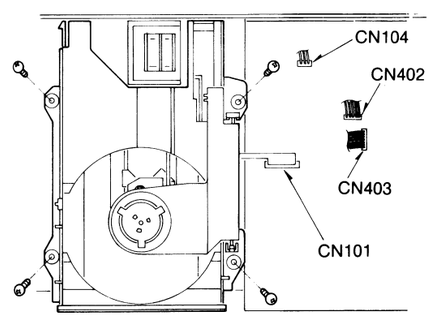
- Be sure to connect the P.C.B. ground terminal (line out terminal) and chassis with a lead wire.

Ref. No. 7 — How to remove the loading base

Procedure 1 ➧ 2 ➧ 7

1. Remove the 3 connectors (CN104, CN402, CN403).
2. Remove the FPC board (CN101).
3. Remove the 4 screws.

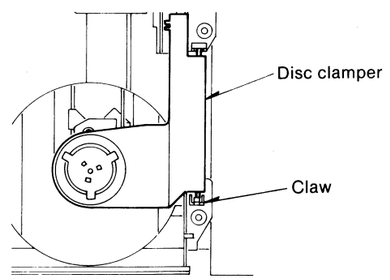
Refer to "HANDLING PRECAUTIONS FOR OPTICAL PICKUP" on page 7.



Ref. No. 8 — How to remove the disc clamper

Procedure 1 ➧ 8

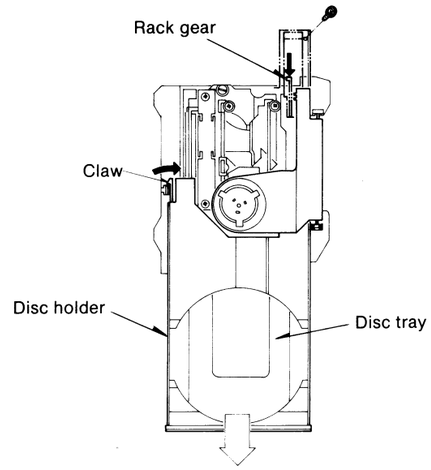
- Release the claw.



Ref. No. 9 — How to remove the disc holder

Procedure 1 ➧ 9

1. Remove the screw.
2. Push the rack gear slowly in the direction of the arrow until the disc tray comes up.
3. Pull the disc holder until it stops.
4. Release the claw.
5. Further pull out the disc holder to remove it.

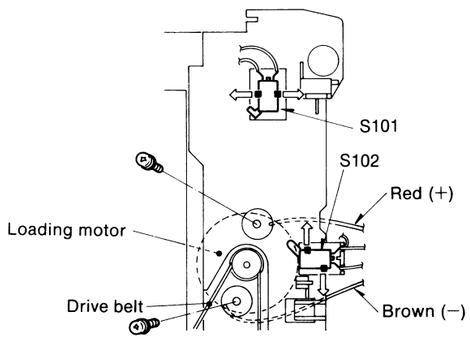


Ref. No. 10 — How to remove the loading motor

Procedure 1 ➧ 2 ➧ 7 ➧ 8 ➧ 9 ➧ 10

1. Remote the drive belt.
2. Remove the 2 screws.

Note:
Red lead wire.....(+) terminal
(close to the slit of the motor)
Brown lead wire.....(−) terminal



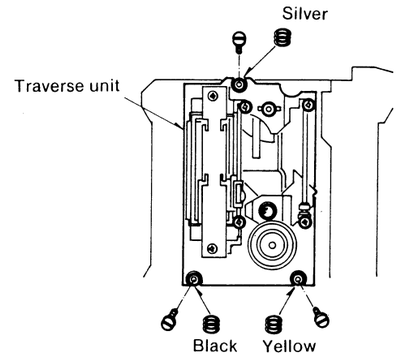
How to remove the switches (S101, S102)

- Release the claws.
- Note the fitting direction before remove it.

Ref. No. 11 — How to remove the traverse unit

Procedure 1 ➧ 2 ➧ 7 ➧ 8 ➧ 9 ➧ 11

- Remove the 3 screws.

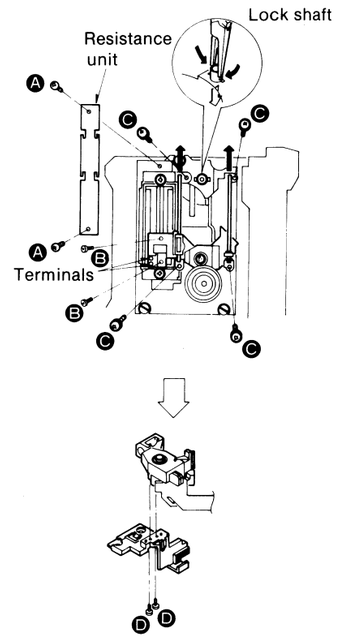


Caution: Note the color of the 3 springs, they must be reinstalled to their original positions.

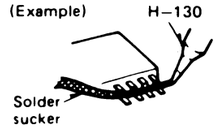
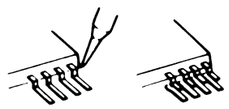
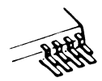
Ref. No. 12 — How to remove the optical pickup

Procedure 1 ➧ 2 ➧ 7 ➧ 8 ➧ 9 ➧ 12

1. Remove the 2 screws Ⓐ and the resistance unit.
2. Unsolder the 2 terminals and 2 screws Ⓑ.
3. Release the claws by using the pliers to remove the lock shaft.
   Remove the 4 screws Ⓒ.
4. Pull out the optical pickup from the 2 guide shafts.
5. Remove the 2 screws Ⓓ to separate the holder from
6. the optical pickup.



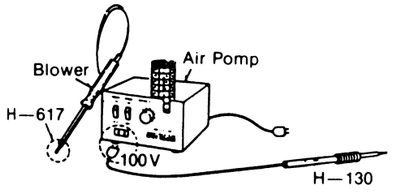
■ HOW TO REPLACE IC'S (Small outline type)

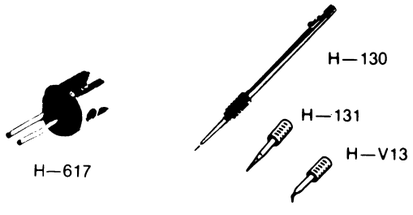
	Replacing procedure		Cautions
1	Reduce the amount of solder on each pin of the integrated circuit by use of a solder sucker.	(Example) H–130 	• Recommended tool .....Special soldering iron * H605M and H-130. * H605E and H-130. • Do not touch the soldering iron to the area for a long time. It may otherwise cause removal of the print foil. • When shifting the pin upward, do the job quickly while the solder is melting. If the solder is hard, it may cause removal or breakage of the print foil. • When using a pencil type soldering iron. 1. Completely remove the solder from each IC pin by use of solder sucker. 2. Raise each pin by means of an eyeleteer, hold the pliers then remove IC package from P.C.B.
2	Melt the solder on the pin (one electrode) with the soldering iron.		
3	While the solder is melting, shift the pin upward by the soldering iron to remove it from the foil.		
4	Remove each pin from the foil according to the above-mentioned procedure.		

*** Special soldering iron**
(Refer to Technical Information, ORDER NO. GAD84125486T1)...For U.S.A. and Canada
(Refer to Technical Information, ORDER NO. GAD84115476T8)...For others

•H–605 Spot Heater (hot-air solder iron)
This device that uses hot air to melt solder was developed to remove Flat-Package ICs, RHCs and chip parts.

- H–605M (For 120V power source)
- H–605E (For 200V/220V/240V power source)





•H–617 Twin Nozzle (for spot heater)
Special nozzle for the removal of RHCs and chip resistors. (Nozzle diameter: 1.0mm×2)

•H–130 Slim Pencil Solder Iron
An ultrasmall ceramic heater solder iron is extremely handy for soldering chip parts, RHCs, ICs etc., to high-density circuit boards.
Features:

- Rated power: 100V, 15W
- Max. temp.: 400°C
- Heater: ceramic (long life)
- Insulation resistance: 100MΩ
- Length: 178mm
- Weight: 16g (not including cord)

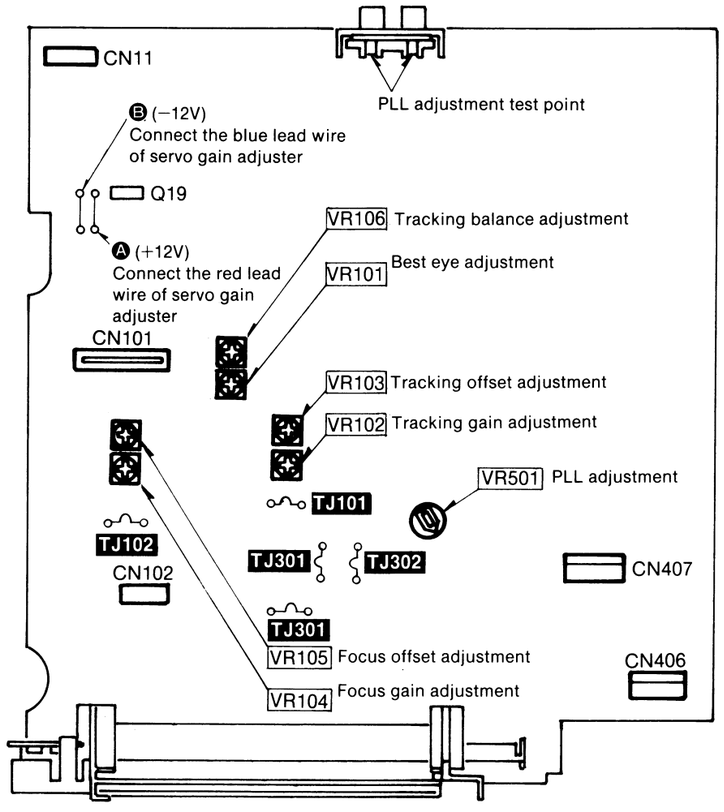
•H–131, H–V13 Cap Bits
Solder tip for the slim pencil Solder Iron is composed of a bit holder and a corrosion resistance solder tip.
Permits changing of solder tips even while still hot.

- Solder tip: 0.3mm

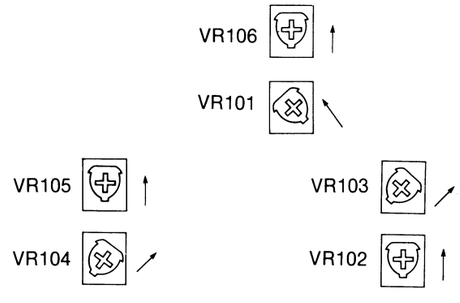
■ MEASUREMENTS AND ADJUSTMENTS

Caution:
● It is very dangerous to look at or touch the laser beam. (Laser radiation is invisible.)
With the unit turned "on", laser radiation is emitted from the pickup lens.
Avoid exposure to the laser beam , especially when performing adjustments.

ADJUSTMENT POINTS



● Temporary Setting of Each VR



ELECTRICAL ADJUSTMENT

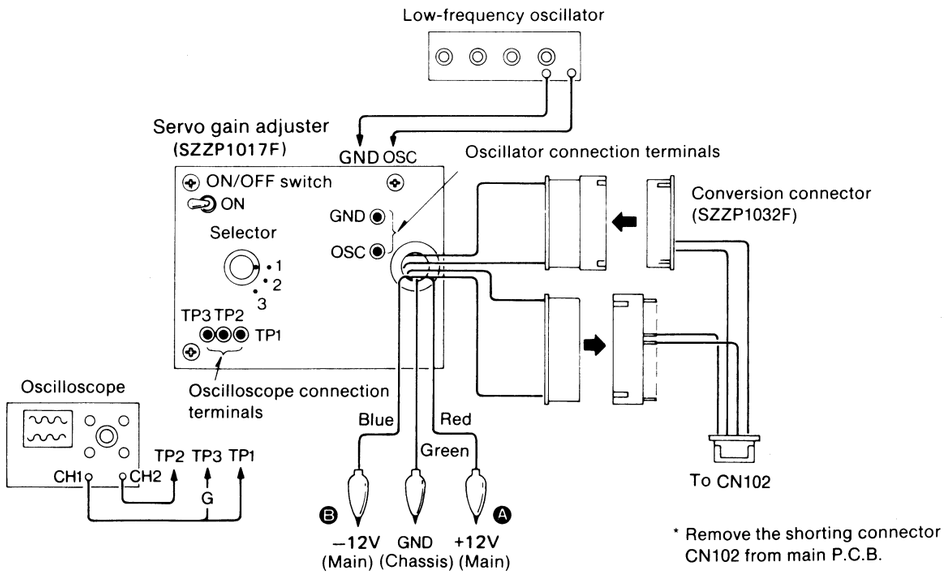
Measuring Instruments and Special Tools

- Servo gain adjuster (SZZP1017F)
- Test disc
  Test disc(SZZP1014F) old and new type
  Inspection test disc (SZZP1054C)
  Unever disc (SZZP1056C)
  Black band disc (SZZP1057C)
- Ordinary disc
- Two-channel oscilloscope (with trigger) of 30MHz or over
- Low frequency oscillator
- Conversion connector(SZZP1032F)

Adjustment Procedure

Step 1: Remove the cabinet. (Refer to page 8.)
↓
Step 2: Make the temporary setting of each VR . (Refer to page 12.)
↓
Step 3: Best eye (PD balance) adjustment. (Refer to page 14.)
↓
Step 4: Connect the servo gain adjuster. (Refer to page 13.)
↓
Step 5: Focus gain adjustment. (Refer to page 14.)
↓
Step 6: Tracking gain adjustment. (Refer to page 14.)
↓
Step 7: Temporary adjustment of focus and tracking offset.(Refer to page 15.)
↓
Step 8: Focus offset adjustment. (Refer to page 15.)
↓
Step 9: Tracking offset adjustment. (Refer to page 15.)
↓
Step 10: Connect the servo gain adjuster. (Refer to page 13.)
↓
Step 11: Tracking offset balance adjustment.(Refer to page 15.)
↓
Step 12:PLL adjustment. (Refer to page 16.)
↓
Step 13: Check of operation after adjustment. (Refer to page 16.)

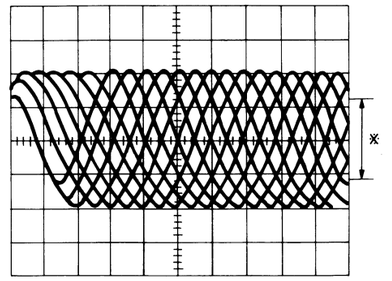
Connection of Servo Gain Adjuster



* Remove the shorting connector CN102 from main P.C.B.

BEST EYE(PD BALANCE) ADJUSTMENT

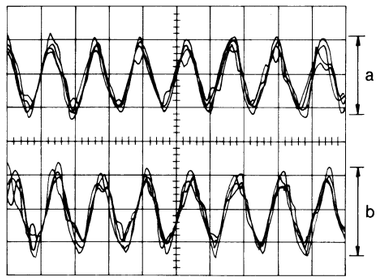
1.Connect CH1 of the oscilloscope to **TJ301** (+) and **TJ302** (-) of the main P.C.B.
Oscilloscope setting:VOLT.....200mV
SWEEP.....0.5µsec.
INPUT.....AC
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
3.Set the player to the play mode.
4.Adjust **VR101** so that the eye pattern of RF signal is stretched to maximum.
5.Turn **OFF** the power switch of the player.



*Most stretched eye pattern

FOCUS GAIN ADJUSTMENT

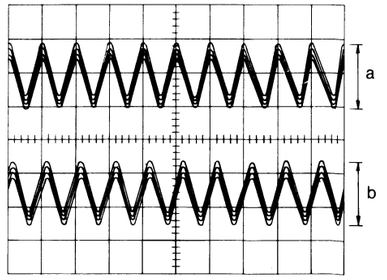
1.Connect the servo gain adjuster.(Refer to page 13.)
2.Set the selector switch of the servo gain adjuster to **2** and ON-OFF switch to **ON.**
3.Set the low frequency oscillator to a frequency of **750Hz** and an output voltage of **100mVp-p.** Then connect the oscillator to the **OSC** (+) and **GND** (-) terminals of the servo gain adjuster.
4.Connect CH1 and CH2 of the oscilloscope to **TP1** and **TP2** of the servo gain adjuster.(TP3 is the ground terminal.)
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....1msec.
INPUT.....DC
5.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
6.Set the player to the play mode.
7.Set the selector switch of the servo gain adjuster from **"2" to "3".**
8.**750Hz** signals will be displayed on the oscilloscope. Adjust **VR104** until the waveform amplitudes of both channels are equal.
9.Shift the selector switch of the servo gain adjuster from **"3" to "2".**
10.Turn **OFF** the power switch of the player.



*Make a=b

TRACKING GAIN ADJUSTMENT

1.Set the low frequency oscillator to a frequency of **1.0kHz** and an output voltage of **100mVp-p.** Then connect the oscillator to the **OSC** (+) and **GND** (-) terminals of the servo gain adjuster.
2.Connect CH1 and CH2 of the oscilloscope to **TP1** and **TP2** of the servo gain adjuster.(TP3 is the ground terminal.)
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....1msec.
INPUT.....DC
3.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
4.Set the player to the play mode.
5.Set the selector switch of the servo gain adjuster from **"2" to "1".**
6.**1.0kHz** signals will be displayed on the oscilloscope. Adjust **VR102** until the waveform amplitudes of both channels are equal.
7.Shift the selector switch of the servo gain adjuster from **"1" to "2".**
8.Turn **OFF** the power switch of the player.
9.Disconect the servo gain adjuster,and insert the short connector of CN102 to the original position.



*Make a=b

TEMPORARY ADJUSTMENT OF FOCUS AND TRACKING OFFSET

(Temporary adjustment of focus offset)

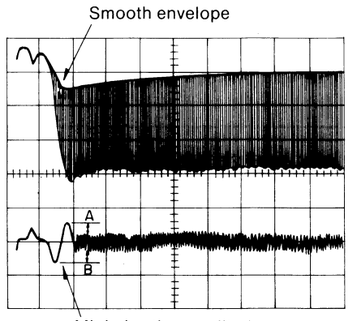
1.Connect CH1 of the oscilloscope **TJ102** (+) and **TJ302** (-) of the main P.C.B.
Oscilloscope setting:VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
3.Set the player to the play mode.
4.After reading TOC , set the player to the stop mode.
5.Adjust **VR105** so that the voltage at the waveform center of the oscilloscope is **0mV.**

(Temporary adjutment of tracking offset)

1.Connect CH1 of the oscilloscope to **TJ101** (+) and **TJ302** (-) of the main P.C.B.
Oscilloscope setting:VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
3.Set the player to the play mode.
4.After reading TOC , set the player to the stop mode.
5.Adjust **VR103** so that the voltage at the waveform center of the oscilloscope is **0mV.**

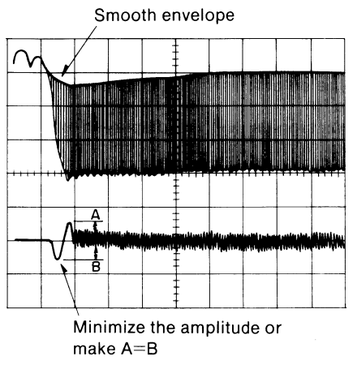
FOCUS OFFSET ADJUSTMENT

1.Connect CH1 of the oscilloscope to the **TJ301** (+) and **TJ302** (-) of the main P.C.B.
Connect CH2 of the oscilloscope to the **TJ102** (+) and **TJ302** (-)of the main P.C.B.
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....0.5msec.
INPUT.....AC(CH1),DC(CH2)
MODE.....NORM
(Triggering via CH1)
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
3.Set the player to the play mode.
4.Check the waveform of CH1 and CH2 on the oscilloscope and adjust **VR105** , so that the waveform around the triggering point becomes as shown in the illustration.



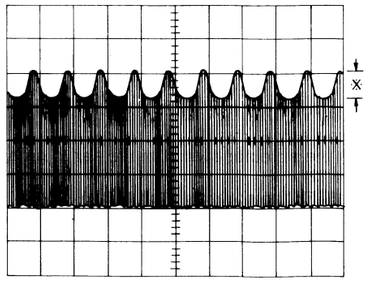
TRACKING OFFSET ADJUSTMENT

1.Connect CH1 of the oscilloscope to the **TJ301** (+) and **TJ302** (-) of the main P.C.B.
Connect CH2 of the oscilloscope to the **TJ101** (+) and **TJ302** (-)of the main P.C.B.
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....0.5msec.
INPUT.....AC(CH1),DC(CH2)
MODE.....NORM
(Triggering via CH1)
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
3.Set the player to the play mode.
4.Check the waveform of CH1 and CH2 on the oscilloscope and adjust **VR103** , so that the waveform around the triggering point becomes as shown in the illustration.



TRACKING OFFSET BALANCE ADJUSTMENT

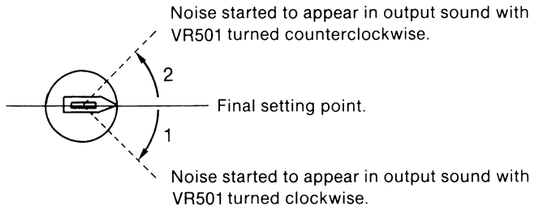
1.Connect the servo gain adjuster.(Refer to page 13.)
2.Set the selector switch of the servo gain adjuster to **2** and ON-OFF switch to **ON.**
3.Set the low frequency oscillator to a frequency of **1kHz** and an output voltage of **200mVp-p.** Then connect the oscillator to the **OSC** (+) and **GND** (-) terminals of the servo gain adjuster.
4.Connect CH1 of the oscilloscope to **TJ301** (+) and **TJ302** (-)of the main P.C.B.
Oscilloscope setting:VOLT.....200mV
SWEEP.....0.5msec.
INPUT.....AC
5.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
6.Set the player to the play mode.
7.Set the selector switch of the servo gain adjuster from **"2" to "1".**
8.Adjust **VR106** so that the output waveform is as shown (jitter is minimized).
9.Shift the selector switch of the servo gain adjuster from **"1" to "2".**
10.Turn **OFF** the power switch of the player.
11.Disconnect the servo gain adjuster,and insert the short connector of CN102 to the original position.



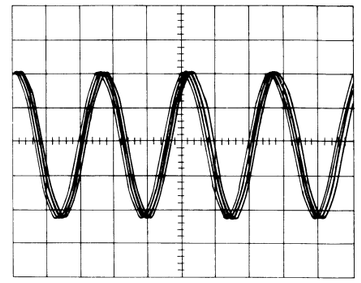
*Jitter should be minimized.

PLL ADJUSMENT

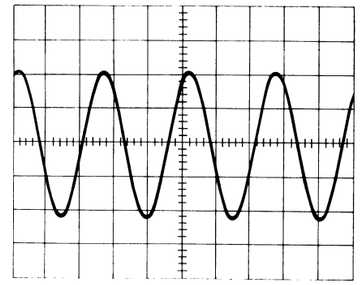
1.Connect CH1 of the oscilloscope to the **LINE OUT terminal** (either of Lch or Rch) and **ground.**
Oscilloscope setting:VOLT.....1V
SWEEP.....1msec.
INPUT.....DC
2.Turn **ON** the power switch of the player and insert a test disc(SZZP1054C).
3.Play **Track 6 (wedge 0.7mm)** of the test disc.
4.Check the waveform displayed on the oscilloscope and adjust **VR501** in the following steps.
Step 1. Turn **VR501** clockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.
Step 2. Turn **VR501** counterclockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.
Step 3. Set **VR501** in the middle between the points observed in the above steps " 1 " and " 2 " .


Noise started to appear in output sound with VR501 turned counterclockwise.
2
Final setting point.
1
Noise started to appear in output sound with VR501 turned clockwise.

• NG



• OK



CHECK OF PLAY OPERATION AFTER ADJUSTMENT

Check of skip search
1.Play an ordinary disc.
2.Press the skip button and verify skip search operation (forward and reverse).

Check of manual search
1.Play an ordinary disc.
2.Press the manual search button and verify that smooth manual search can be performed at low and high speeds (forward and reverse).

Check of playability
1.Play the test disc (SZZP1054C).
2.Play the track 6 (wedge 0.7mm) and verify that there is no skip sound or noise.
3.Play the track 13 (black dot 0.7mm) and verify that there is no skip sound or noise.

OPTICAL PICKUP ADJUSTMENT

Measuring Instruments and Special Tools

- Tow-channel oscilloscope (with trigger) of 30mHz or over
- Test disc
  Test disc (SZZP1014F) old and new type
  Inspection test disc (SZZP1054C)
  Unever disc (SZZP1056C)
- Hexagonal wrench (SZZP1044C....1.5mm)
- Screw lock paint (RZZ0L01)

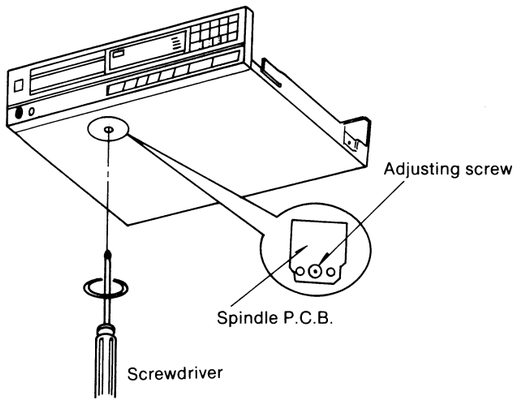
Adjustment Procedure

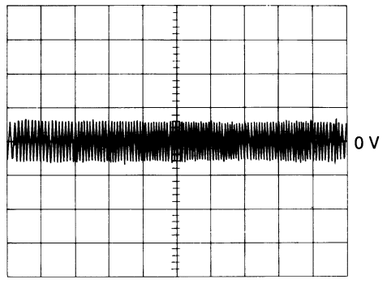
- If the optical pickup is replaced , adjust it according to the following procedure.

Step 1: Assemble the set to make it ready for power ON check.
↓
Step 2: Make the temporary setting of each VR.(Refer to page 12.)
↓
Step 3: Turntable height adjustment. (Refer to page 17.)
↓
Step 4: Mechanical adjustment. (Refer to page 17.)
↓
Step 5: Electrical adjustment. (Refer to page 13.)

TURNTABLE HEIGHT ADJUSTMENT

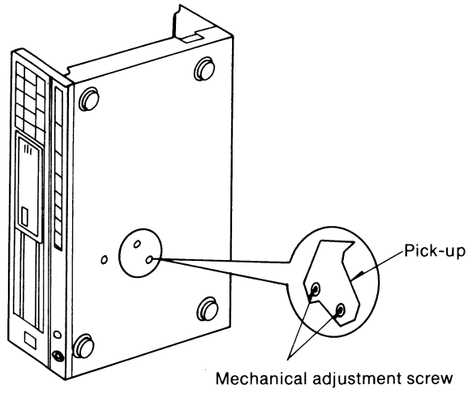
1.Connect CH1 of the oscilloscope to **TJ102** (+) and **TJ302** (-) of the main P.C.B.
Oscilloscope setting:VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC
2.Set the oscilloscope to DC zero balance.
3.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
4.Set the player to the play mode.
5.Turn the **adjusting screw** at the bottom of the spindle motor drive P.C.B. with a flat screwdriver so that the waveform is balanced at **0 ± 50mV.**
6.Turn **OFF** the power switch of the player.
7.After the adjustment , apply **screw lock paint(RZZ0L01)** to the adjusting screw.

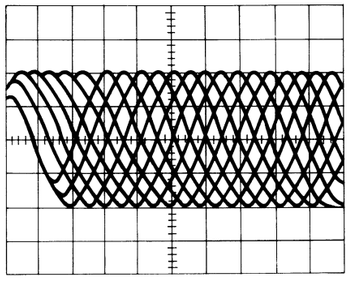




MECHANICAL ADJUSTMENT

1.Connect CH1 of the oscilloscope to **TJ301** (+) and **TJ302** (-) of the main P.C.B.
Oscilloscope setting:VOLT.....200mV
SWEEP.....0.5µsec.
INPUT.....AC
2.Turn **ON** the power switch of the player and insert a test disc (SZZP1056C).
3.Monitoring the RF signal on the oscilloscope , adjust the **two adjusting screws** alternately so that the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.
4.Turn **OFF** the power switch of the player.
5.After the adjustment , apply **screw lock paint(RZZ0L01)** to the adjusting screw.





Note: The mechanical adjustment screws has been already locked with screw lock paint at the factory. So, it might be hard to turn them.

■ TERMINAL FUNCTION OF LSI

• MN6617S (Digital Signal Processing: EFM Decoder, Error Correction, CLV Servo)

Pin No.	Mark	I/O	Function
1	BLKCK	O	Sub-code block (Q data) clock (75 Hz)
2	CLDCK	O	Sub-code frame (Q data) clock (7.35 kHz)
3	SUBQ	O	Sub-code (Q data) output
4	CRC	O	Sub-code (Q data) CRC check (Not used, open)
5	RST	I	Reset signal input (reset at "L")
6	MLD	I	Command load input
7	MCLK	I	Command clock input
8	MDATA	I	Command data input
9	DMUTE	I	Muting control
10	TRON	I	Tracking servo ON signal (tracking servo ON at "L")
11	STAT	O	Processing condition (CRC, OTC, CLVOK, TTSTOP) output
12	SMCK	O	Clock output (4.2336 MHz)
13	PMCK	O	Picth control clock output (Not used, open)
14	ITC	I	Track counter input signal (Not used, open)
15	TEST	I	Test mode selection (Not used, connected to +5V)
16	X2	O	Clock output
17	X1	I	Clock input
18	SEL	I	DA output parallel/serial selection (serial at "L")
19	LDG	O	L channel deglitch signal (Not used, open)
20	RDG	O	Clock signal output for spindle motor control
21	DEMPH	O	De-emphasis ON signal (de-emphasis ON at "H")
22	IPFLAG	O	Interpolation flag (interpolation at "H")
23	FLAGO	O	Error flag (error at "H")
24	FLAG6	O	16 K RAM address reset signal (reset at "H")
25	XCK	O	Clock (16.9344 MHz) output
26	DA15	O	Serial data output (MSB first)
27	DA14	O	(Not used, open)
28	DA13	O	Serial data beat clock
29	DA12	O	Serial data word clock (Not used, open)
30	DA11	O	Serial data byte clock (Not used, open)
31	GND	I	GND terminal
32	DA10	O	R/L channel changeover signal
33	DA9	O	Resynchronizing signal (Not used, open)

Pin No.	Mark	I/O	Function
34	DA8	O	Synchronizing detection signal (Not used, open)
35	DA7	O	Interpolation flag for each byte (Not used, open)
36	DA6	I/O	Interpolation prohibited (Not used, connected to GND)
37	DA5	O	C2 decoder correction flag 3 (Not used, open)
38	DA4	O	C2 decoder correction flag 2 (Not used, open)
39	DA3	O	C2 decoder correction flag 1 (Not used, open)
40	DA2	O	C1 decoder correction flag 2 (Not used, open)
41	DA1	O	C1 decoder correction flag 1 (Not used, open)
42	DA0	O	Crystal frame clock (Not used, open)
43 ~ 50	D7 ~ D0	I/O	16 K RAM data output
51	REMOTE	O	16 K RAM OE signal
52	RAMWE	O	16 K RAM WE signal
53 ~ 63	RAMA 0 ~ RAMA10	O	16 K RAM address signal (RAMA0 : LSB, RAMA10: MSB)
64	PC	O	Spindle motor ON signal (ON at "L")
65	EC	O	Spindle motor drive signal
66	FG	I	Spindle motor FG signal input (Not used, open)
67	VCNT	—	(Not used, connected to GND)
68	REXT	—	(Not used, connected to GND)
69	VDD	I	Power supply (+5V)
70	PD	—	(Not used, open)
71	PCKO	—	(Not used, open)
72	PCK	I	PLL extract clock input
73	VDD	I	Power supply Connected to +5V)
74	EFM	I	EFM signal input (PLL)
75	SRF	I	EFM signal input (DSL)
76	DO	I	Drop-out signal (Drop-out at "H")
77	CLVS	O	11T servo OK signal (OK at "H")
78	FPC	O	PLL frequency comparision signal
79	BSSEL	O	PLL frequency in take operation signal. (Not used, open)
80	SRFO	—	(Not used, open)
81	NSRF	—	(Not used, open)
82	RF	—	(Not used, open)
83	SUBC	O	Sub-code serial output data (Not used, open)
84	SBCK	I	Clock for sub-code serial output (Not used, open)

• MN6618A (Digital Filter)

Pin No.	Mark	I/O	Function
1	NC	—	Not connected
2	D012	O	16-bit data output
3	D011	O	16-bit data output
4	D010	O	16-bit data output
5	GND	I	GND terminal
6	D09	O	16-bit data output
7	NC	—	Not connected
8	D08	O	16-bit data output
9	D07	O	16-bit data output
10	NC	—	Not connected
11	NC	—	Not connected
12	D06	O	16-bit data output
13	D05	O	16-bit data output
14	D04	O	16-bit data output
15	D03	O	16-bit data output
16	NC	—	Not connected
17	NC	—	Not connected
18	D02	O	16-bit data output
19	D01	O	16-bit data output
20	D00	O	16-bit data output
21	MDATA	I	Command data input
22	NC	—	Not connected

Pin No.	Mark	I/O	Function
23	MCLK	I	Command clock input
24	MLD	I	Command load input
25	NC	—	Not connected
26	RST	I	Reset signal input (reset at "L")
27	—	—	————
28	LRCK	I	L/R channel changeover signal
29	NC	—	Not connected
30	SFT	I	Serial data input clock
31	SIN	I	Serial data input
32	NC	—	Not connected
33	X OUT	O	Clock output (Not used, open)
34	X IN	I	Clock input (16.9244 MHz)
35	OSEL	I	DA output parallel/serial changeover (Parallel at "L")
36	LDGL	O	L channel deglitch signal
37	RDGL	O	R channel deglitch signal
38	VDD	I	Power supply (connected to +5V)
39	D015	O	16-bit data output (MSB)
40	D014	O	16-bit data output
41	NC	—	Not connected
42	D013	O	16-bit data output

• AN8290S (Spindle Motor Drive)

Pin No.	Mark	I/O	Function
1	GND	I	Minimum potential of IC control. (In this unit, it is connected to VEE [−8.0V])
2	DCR	I	Standard voltage of FAI, PC, CLK. (In this unit, it is connected to 2.5V.)
3	FAI	I	Torque command filter amp. input. (Normal rotation command when FAI < DCR.)
4	FAO	O	Filter amp. output.
5	DI	I	Absolute value circuit input.
6	LPF	I	Capacitor terminal for low pass filter of current feedback loop.
7	A1	O	Drive signal output.
8	A2	O	
9	A3	O	
10	PGND	I	Minimum potential of IC power. (In this unit, it is connected to VEE [−8.0V])
11	CS	I	Drive current detection resistor terminal.
12	PVCC	I	Power input for IC power.

Pin No.	Mark	I/O	Function
13	NC	I	Not used in this unit.
14	NC	I	
15	H2−	I	Negative output of Hall element is input.
16	H2+	I	Positive output of Hall element is input.
17	H1−	I	Negative output of Hall element is input.
18	H1+	I	Positive output of Hall element is input.
19	HSW	I	Bias switch of Hall element. (OFF when PC > DCR)
20	HB	I	Bias power of Hall element.
21	VCC	I	Power input for IC control.
22	PC	I	Power control. (Power down mode when PC > DCR)
23	CLK	I	Clock input. (DCR standard, operated at the edge of rise.)
24	TC	I	Triangular wave generation capacitor terminal.

• AN8370S (Optical Servo Control)

Pin No.	Mark	I/O	Function
1	VEE	I	Power supply (connected to −5V)
2	LSA	I	Phase difference input (A)
3	GND	I	GND terminal
4	LSB	I	Phase difference input (B)
5	APC	O	Auto laser power control output
6	TEOUT	O	Tracking error signal output
7	TEG	I	Tracking error gain adjusting input
8	TE+	I	Phase difference-to-voltage conversion (+)
9	TE−	I	Phase difference-to-voltage conversion (−)
10	APC−	I	Laser power inversion input
11	C·MEM	I	Capacitor connection for phase difference memory
12	APC+	I	Laser power input
13	VREF	O	Reference current generation
14	SENSE	O	Selector output (track-crossed)
15	HIN	I	Tracking hold circuit input
16	HOUT	O	Tracking hold circuit output
17	SPCNT	O	Track-cross speed control output (not used, open)
18	C·MSP	I	Track-cross reference speed setting capacitor connection (not used, open)
19	C·AF	I	Auto focus timer capacitor connection
20	KICK R/F	O	Track kick signal output
21	VCC	I	Power supply (connected to +5V)

Pin No.	Mark	I/O	Function
22	CNT1	I	Control input ($\overline{\text{FOON}}$: Focus servo ON signal)
23	CNT2	I	Control input ($\overline{\text{TRON}}$: Tracking servo ON signal)
24	CNT3	I	Control input (KICKF: Kick direction [Forward] command)
25	CNT4	I	Control input (KICKR: Kick direction [Reverse] command)
26	$\overline{\text{F·LOCK}}$	O	Focus lock signal output
27	C·FBDO	O	Capacitor connection for inversion RF high speed detection
28	C·SBDO	O	Capacitor connection for inversion RF low speed detection
29	C·SBRT	O	Capacitor connection for non-inversion RF low speed detection
30	C·FBRT	O	Capacitor connection for non-inversion RF high speed detection
31	RF OUT	O	RF signal output
32	BDO	O	Drop-out detection output
33	RF IN	I	RF signal input
34	S·OUT	O	Focus search signal output
35	C·LW	I	Capacitor connection for triangular wave generation
36	FE·OUT	O	Focus error signal output
37	FEG	I	Focus error gain adjusting input
38	FE·REF	I	Focus error comparison voltage generation
39	PDB	I	Photo detector current input (B)
40	IVB	O	Current to voltage conversion (B)
41	IVA	O	Current to voltage conversion (A)
42	PDA	I	Photo detector current input (A)

• AN8371S (Data slice and PLL)

Pin No.	Mark	I/O	Function
1	VEE	I	Power supply (connected to −5V)
2	SRF	O	RF signal output data-sliced into digital value
3	EFM	O	EFM signal output synchronized with PCK
4	D·GND	I	GND terminal (digital system)
5	PCK	O	Clock output extracted from SRF
6	VCC	I	Power supply (connected to +5V)
7	VA	I	VCO free ran frequency adjusting current input
8	VC1	I	Capacitor connection for VCO oscillation frequency
9	VC2	I	Capacitor connection for VCO oscillation frequency
10	VR	I	Resistor connection for VCO oscillation frequency
11	PD	I	Capacitor connection for PLL DO protection
12	PL1	I	PLL loop filter constant connection

Pin No.	Mark	I/O	Function
13	PL2	I	PLL loop filter constant connection
14	FPC	I	Frequency comparison error signal input
15	RF	I	RF signal input
16	ARF	O	RF signal output with AGC applied
17	AGC	I	ARF signal input for AGC drop-out detection
18	AC	I	AGC loop filter constant connection
19	DO	O	Drop-out detection pulse output
20	A·GND	I	GND terminal (analog system)
21	DSL	I	RF signal input for data slicer
22	SLC	I	Slice level control signal input
23	FC1	I	Data slicer filter capacitor connection
24	FC2	I	Data slicer filter capacitor connection

• MN15261PDV (System Control and FL Drive)

Pin No.	Mark	Signal	I/O	Function
1	VSS	GND	I	GND terminal
2	XO	—	O	Not used (Open)
3	XI	SENSE	I	Optical servo condition input
4	P00	PC	O	(Not used, open)
5	P01	M DATA	O	Command data outut
6	P02	MCLK	O	Command clock output
7	P03	MLD	O	Command load output
8	P10	MRLY	I	Muting control
9	P11	B-DAT	I	(Not used, open)
10	P12	SYNC	I	(Not used, open)
11	P13	D-DP	I	(Not used, open)
12	SYNC	—	O	(Not used, open)
13	RST	RESET	I	Reset signal input (reset at "L")
14	IRQ	BLKCK	I	Sub-code block (Q data) clock (75 Hz) input
15 ~ 18	P50 ~ P53	KEY	I	Key scan input
19	SBT	CLDCK	I	Sub-code frame clock (7.35 kHz)
20	SBD	SUBQ	I	Sub-code Q data input
21	P20	TGC	O	(Not used, open)
22	P21	TRV-H	O	(Not used, open)
23	P22	TRV-R	O	Traverse reverse command signal
24	P23	TRV-F	O	Traverse forward command signal
25	P30	CNT4	O	Optical servo IC control signal (KICKR: Kick direction [Reverse] command)
26	P31	CNT3	O	Optical servo IC control signal (KICKF: Kick direction [Forward] command)
27	P32	CNT2	O	Optical servo IC control signal (TRON: Tracking servo)
28	P33	CNT1	O	Optical servo IC control signal (FOON: Focus servo)
29	P40	START	I	Key input strobe and processing status input from signal processing LSI traverse position detection.
30	P41	D-END	O	(Not used, open)
31	P42	FLOCK	I	Optical servo condition (focus) input
32	P43	SENSE	I	Optical servo condition (track cross) input
33	PE0	CLOSE	O	Loading motor close signal
34	PE1	OPEN	O	Loading motor open signal
35	P60	PAUSE	O	Pause LED drive
36	P61	PLAY	O	Play LED drive
37	DAC	DAC	O	(Not used, open)
38	VPP	—	I	FL drive power supply (connected to −32V)
39 ~ 52	D0 ~ DD	—	O	FL grid signal and key scan signal
53 ~ 61	S8 ~ S0	—	O	FL anode signal
62	OSC2	—	I	Clock terminal
63	OSC1	—	I	Clock input
64	VDD	—	I	Power supply (connected to +5V)

• MN1550PDT (Remote Control Signal Processing)

Pin No.	Mark	Signal	I/O	Function
1	VDD	——	I	Power supply (connected to +5V)
2	OSC1	SMCK	I	Clock input
3	OSC2	——	——	Not used, open
4	P22	——	——	Not used, open
5	RST	RESET	I	Reset signal input
6	P21	——	——	Not used, open
7	P20	——	I	Remote control signal input
8	IRQ	——	I	Program enable/de-enable control
9	P31	——	O	Remote control LED drive
10 ~ 13	P13 ~ P0	Data	I	Key strobe
14 ~ 17	P03 ~ P00	Data	I	Key strobe
18	VSS	GND	I	GND terminal

■ RESISTORS & CAPACITORS

Notes: * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

Numbering System of Resistor

Example

ERD	25	F	J	102
Type	Wattage	Shape	Tolerance	Value

ERX	2	AN	J	471
Type	Wattage	Shape	Tolerance	Value 47x10¹ (ohm)

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity

ECEA	50	M	330
Type	Voltage	Peculiarity	Value (33x10° microfarad)

Resistor Type	Wattage	Tolerance
ERD : Carbon ERG : Metal Oxide ERX : Metal Film ERQ : Fuse Type Metal ERD☐ L : Carbon (chip) ERO☐ K : Metal Film (chip) ERC : Solid	10 : 1/8W 12 : 1/2W 25 : 1/4W 1A : 1W 18 : 1/8W S2 : 1/4W S1 : 1/2W 2F : 1/4W 50 : 1/2W 2A : 2W	J : ±5% F : ±1% G : ±2% K : ±10%

Capacitor Type	Voltage	Tolerance
ECE : Electrolytic ECCD : Ceramic ECKD : Ceramic ECQM : Polyester ECQP : Polyproylene ECG : Ceramic ECEA☐☐☐N: Non Polar Electrolytic QCU☐ : Ceramic (Chip Type) ECUX : Ceramic (Chip Type) ECF : Semiconductor EECW : Liquid electrolyte double layer capcitor	0J : 6.3V 1A : 10V 1C : 16V 1E : 25V 1H : 50V 1V : 35V 50 : 50V 05 : 50V 2H : 500V 2A : 100V 1 : 100V KC : 400V AC KC : 125VAC (UL) 1J : 63V	C : ±0.25pF J : ±5% K : ±10% Z : +80% −20% P : +100% −0% M : ±20% D : ±0.5pF G : ±2%

Ref. No.	Part No.	Part Code
RESISTORS		
R11, R12	ERDS2TJ682	001 152 2365 1
R13	ERDS2TJ101	001 152 2421 0
R14	ERDS2TJ471	001 152 2361 5
R15, R16	ERDS2TJ561	001 152 2364 2
R17, R18	ERDS2TJ471	001 152 2361 5
R19, R20	ERDS2TJ471	001 152 2361 5
R21	ERDS2TJ222	001 152 2353 5
R22, R23	ERDS2TJ331	001 152 2356 2
R101	ERDS2TJ154	001 152 2427 4
R102, R103	ERDS2TJ472	001 152 2362 4
R104	ERDS2TJ223	001 152 2432 7
R105	ERDS2TJ334	001 152 2438 1
R107	ERDS2TJ683	001 152 2450 5
R108	ERDS2TJ332	001 152 2357 1
R109	ERDS2TJ822	001 152 2455 0
R110, R111	ERDS2TJ682	001 152 2365 1
R112	ERDS2TJ822	001 152 2455 0
R113, R114	ERDS2TJ152	001 152 2350 8
R115	ERDS2TJ102	001 152 2346 4
R116, R117	ERDS2TJ182	001 152 2352 6
R118	ERDS2TJ102	001 152 2346 4
R119	ERDS2TJ471	001 152 2361 5
R120	ERDS2TJ120	001 152 3146 6
R122	ERDS2TJ471	001 152 2361 5
R141	ERDS2TJ102	001 152 2346 4
R142	ERDS2TJ333	001 152 2358 0
R143	ERDS2TJ224	001 152 2433 6
R144	ERDS2TJ333	001 152 2358 0
R145	ERDS2TJ153	001 152 2351 7
R146	ERDS2TJ122	001 152 2423 8
R147	ERDS2TJ682	001 152 2365 1
R148	ERDS2TJ104	001 152 2348 2
R149	ERDS2TJ152	001 152 2350 8
R150	ERDS2TJ103	001 152 2347 3
R151	ERDS2TJ101	001 152 2421 0
R152	ERDS2TJ153	001 152 2351 7
R153	ERDS2TJ270	001 152 2434 5
R154	ERDS2TJ3R3	001 152 3152 8
R161	ERDS2TJ333	001 152 2358 0
R162	ERDS2TJ222	001 152 2353 5
R163	ERDS2TJ333	001 152 2358 0
R164	ERDS2TJ153	001 152 2351 7
R165	ERDS2TJ122	001 152 2423 8
R166	ERDS2TJ102	001 152 2346 4
R167	ERDS2TJ681	001 152 2449 8
R168	ERDS2TJ272	001 152 2354 4
R169	ERDS2TJ392	001 152 2439 0
R170	ERDS2TJ101	001 152 2421 0
R171	ERDS2TJ270	001 152 2434 5
R172	ERDS2TJ3R3	001 152 3152 8
R180	ERDS2TJ474	001 152 2443 4
R181	ERDS2TJ471	001 152 2361 5
R182, R183	ERDS2TJ564	001 152 2447 0
R184	ERDS2TJ223	001 152 2432 7
R185, R186	ERDS2TJ473	001 152 2363 3
R187, R188	ERDS2TJ473	001 152 2363 3
R189, R190	ERDS2TJ123	001 152 2424 7
R191	ERDS2TJ154	001 152 2427 4
R192	ERDS2TJ824	001 152 2457 8
R193	ERDS2TJ101	001 152 2421 0
R194	ERDS2TJ683	001 152 2450 5
R195, R196	ERDS2TJ103	001 152 2347 3
R197	ERDS2TJ473	001 152 2363 3
R198	ERDS2TJ393	001 152 2440 7
R302	ERDS2TJ472	001 152 2362 4
R303, R304	ERDS2TJ102	001 152 2346 4
R307	ERDS2TJ471	001 152 2361 5
R309	ERDS2TJ472	001 152 2362 4
R401, R402	ERDS2TJ223	001 152 2432 7
R403	ERDS2TJ472	001 152 2362 4
R404, R406	ERDS2TJ394	001 152 2441 6
R407	ERDS2TJ152	001 152 2350 8
R409, R410	ERDS2TJ472	001 152 2362 4
R411, R412	ERDS2TJ472	001 152 2362 4
R413, R414	ERDS2TJ472	001 152 2362 4
R415	ERDS2TJ472	001 152 2362 4
R416	ERDS2TJ913	001 152 3708 4
R417	ERDS2TJ124	001 152 2425 6
R418	ERDS2TJ913	001 152 3708 4
R419	ERDS2TJ124	001 152 2425 6
R420	ERDS2TJ101	001 152 2421 0
R423	ERDS2TJ103	001 152 2347 3
R424	ERDS2TJ473	001 152 2363 3
R425, R426	ERDS2TJ103	001 152 2347 3
R427, R428	ERDS2TJ103	001 152 2347 3
R429, R430	ERDS2TJ222	001 152 2353 5
R431, R432	ERDS2TJ222	001 152 2353 5
R434	ERDS2TJ472	001 152 2362 4
R451	ERDS2TJ181	001 152 2428 3
R452	ERDS2TJ271	001 152 2435 4
R501	ERDS2TJ224	001 152 2433 6
R502	ERDS2TJ562	001 152 2445 2
R503	ERDS2TJ474	001 152 2443 4
R504	ERDS2TJ221	001 152 2431 8
R505	ERDS2TJ104	001 152 2348 2
R506	ERDS2TJ333	001 152 2358 0
R507	ERDS2TJ102	001 152 2346 4
R601, R602	ERJ8GEYK1R5	001 151 6260 8
R603	ERJ8GEYJ223	001 151 5630 6
R801, R802	ERDS2TJ222	001 152 2353 5
R803, R804	ERDS2TJ272	001 152 2354 4
R805, R806	ERDS2TJ473	001 152 2363 3
R807, R808	ERDS2TJ561	001 152 2364 2
R809, R810	ERDS2TJ121	001 152 2349 1
R811, R812	ERDS2TJ473	001 152 2363 3
R813, R814	ERDS2TJ104	001 152 2348 2
R851	ERDS2TJ102	001 152 2346 4
R852	ERDS2TJ471	001 152 2361 5
R853, R854	ERDS2TJ102	001 152 2346 4
R855, R856	ERDS2TJ472	001 152 2362 4
R857	ERDS2TJ104	001 152 2348 2
R861, R862	ERDS2TJ102	001 152 2346 4
R871, R872	ERDS2TJ103	001 152 2347 3
R873, R874	ERDS2TJ473	001 152 2363 3
R875, R876	ERDS2TJ121	001 152 2349 1
R877, R878	ERDS2TJ103	001 152 2347 3
R879, R880	ERDS2TJ222	001 152 2353 5
CAPACITORS		
C1 ⚠	ECKDKC103PF2	001 103 3734 7
C2, C3 ⚠	ECKD1H103PF	001 103 1449 7
C11, C12	ECEA1CU222	001 120 3074 3
C13, C14	ECEA1CU331	001 120 3200 5
C15, C16	ECEA1VU101	001 120 2929 5
C17, C18	ECFF1E104ZF	001 103 4992 7
C19	ECEA1AFS101	001 120 5163 5
C20, C21	ECEA0JK101	001 120 0136 8

Ref. No.	Part No.	Part Code
C22	ECBT1E103ZF	001 103 9102 9
C23	ECEA0JK221	001 120 3156 2
C25	ECFF1E104ZF	001 103 4992 7
C27, C28	ECBT1E103ZF	001 103 9102 9
C29, C30	REC1A101M0T	001 120 5628 3
C31, C32	ECEA1CU221	001 120 2833 2
C40	ECEA1AFS101	001 120 5163 5
C101	ECFF1E104ZF	001 103 4992 7
C102, C103	ECKD1H102KB	001 103 1414 8
C104	ECKD1H681K	001 103 1580 5
C105, C106	ECKD1H471KB	001 103 1551 0
C107	ECCD1H220K	001 103 0493 7
C108	ECEA1HK0R1	001 120 0340 6
C109	ECEA1HK010	001 120 0341 5
C110	ECFF1E104ZF	001 103 4992 7
C111, C112	ECEA1CKS100	001 120 2600 7
C113	ECEA1HKNR33	001 120 3230 9
C114	RCBS1C182MXY	001 103 8660 8
C115	ECKD1H682KB	001 103 1592 1
C116	ECQM1H333KF	001 106 5385 5
C117	RCBS1H221KBY	001 103 5603 9
C118	ECEA1HK010	001 120 0341 5
C119	ECEA0JK220	001 120 0139 5
C120	ECKD1H681K	001 103 1580 5
C121	ECFTD103KXL	001 108 0341 7
C122	ECBT1H101KB5	001 103 8122 9
C123	ECKD1H101KB	001 103 1412 0
C124	ECKD1H222KB	001 103 1494 2
C125	ECEA0JK220	001 120 0139 5
C126	ECEA0JK470	001 120 0143 9
C127, C128	ECKD1H102KB	001 103 1414 8
C129	ECKD1H681K	001 103 1580 5
C141	ECQM1H153JZ	001 106 0704 0
C142	ECQM1H122KF	001 106 5383 7
C143	ECQM1H473KF	001 106 5386 4
C144	ECEA1HKN2R2	001 120 3231 8
C145	ECEA1HKNR22	001 120 4888 9
C161	ECQM1H153JZ	001 106 0704 0
C162	ECKD1H681K	001 103 1580 5
C163	ECQM1H103KF	001 106 5381 9
C164	ECEA1EKN3R3	001 120 4796 2
C165	ECEA1HKN0R1	001 120 5291 8
C181	ECQM1H474JZ	001 106 2709 7
C182	ECKD1H221KB	001 103 1487 1
C183	ECQM1H682KF	001 106 5387 3
C184	ECEA1HKN010	001 120 2558 2
C186	ECQM1H224JZ	001 106 0746 0
C187	ECEA1HKN2R2	001 120 3231 8
C201	ECFTD103KXL	001 108 0341 7
C301	ECCD1H220K	001 103 0493 7
C302	ECCD1H070CC	001 103 0271 9
C308	ECFF1E104ZF	001 103 4992 7
C309	ECCD1H070CC	001 103 0271 9
C310, C401	ECFF1E104ZF	001 103 4992 7
C402	ECEA0JK470	001 120 0143 9
C403	ECFTD103KXL	001 108 0341 7
C404, C405	ECFF1E104ZF	001 103 4992 7
C406	ECCD1H220K	001 103 0493 7
C407	ECBT1H101KB5	001 103 8122 9
C501	ECQM1H104KF	001 106 5382 8
C502	ECFF1E104ZF	001 103 4992 7
C503	ECEA1CKS100	001 120 2600 7
C504, C505	ECFF1E104ZF	001 103 4992 7
C506	ECCD1H150JC	001 103 0402 6
C507	ECKD1H102KB	001 103 1414 8
C508	ECEA1CKN100	001 120 3185 7
C509	ECCD1H100KC	001 103 0321 6
C510	ECQM1H104KF	001 106 5382 8
C511	ECEA1HKR47	001 120 0338 0
C512, C513	ECKD1H681K	001 103 1580 5
C514	ECQM1H154JZ	001 106 0712 0
C515	ECQM1H153JZ	001 106 0704 0
C516	ECEA1HKN2R2	001 120 3231 8
C517	ECKD1H471KB	001 103 1551 0
C601	ECEV1EV330	001 120 5624 7
C602	ECEV1HV010	001 120 5625 6
C604	GR426B273K50	001 103 9113 6
C606	GR426B152K25	001 103 9112 7
C607	GR426B104Z25	
C611, C612	ECEA1EN470S	001 120 2394 4
C613	ECEA1EN470S	001 120 2394 4
C801, C802	ECKD1H221KB	001 103 1487 1
C803, C804	RBP1CN220CT	001 120 5015 6
C805, C806	ECKD1H102KB	001 103 1414 8
C809, C810	ECEA0JU471	001 120 2924 0
C811, C812	RBP1CN220CT	001 120 5015 6
C851	ECEA0JU471	001 120 2924 0
C852	ECEA1CKN100	001 120 3185 7
C861, C862	ECEA1CU101	001 120 2926 8
C871, C872	ECBT1E223ZF	001 103 7589 2
C873, C874	ECBT1E103ZF	001 103 9102 9
C875	ECBT1E103ZF	001 103 9102 9
C877, C878	ECEA1HKN010	001 120 2558 2

■ REPLACEMENT PARTS LIST

Notes: * Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

Ref. No.	Part No.	Part Code	Description
INTEGRATED CIRCUITS			
IC11	SVILM2931Z	001 061 4828 9	I.C., REGULATOR
IC101	AN8370S	001 060 8399 8	I.C., SERVO
IC102	MN6636S	001 061 3044 7	I.C., ANALOG SW.
IC103	AN6554NS	001 060 4860 4	I.C., OPERATION AMP.
IC104, IC105	AN6552S	001 060 7386 7	I.C., OPERATION AMP.
IC301	MN6617	001 060 8411 9	I.C., SIGNAL PROCESSING
IC302	MN6618A	001 061 3043 8	I.C., DIGITAL FILTER
IC303	SVICXK5816M	001 061 3298 7	I.C., 16K RAM
IC401	MN15261PDV	001 061 4935 7	I.C., SYSTEM CONTROL
IC402	AN6552S	001 060 7386 7	I.C., OPERATION AMP.
IC403	MN1280-R	001 060 8669 5	I.C., RESET
IC404	MN1550PDT	001 061 3639 6	I.C., MICRO COMPUTER
IC501	AN8371S	001 060 8400 2	I.C., PLL
IC601	AN8290S	001 061 3034 9	I.C., SPINDLE DRIVE
IC602 (M, MC)	SVIBX1438M	001 061 3235 2	I.C., REMOTE RECEIVER
IC602 (E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)	SVIBX1439E	001 061 3671 6	I.C., REMOTE RECEIVER
IC801	SVIPCM54JP	001 061 4861 8	I.C., D/A CONVERTER
IC802	MN6636S	001 061 3044 7	I.C., ANALOG SW.
IC803	SVILM833M	001 061 4829 8	I.C., OPERATION AMP.
IC804	SVIHAF0238	001 061 4827 0	I.C., LPF
IC805	SVINJM4560M	001 060 8388 1	I.C., OPERATION AMP.
IC871	SVIM5218L	001 061 4830 5	I.C., OPERATION AMP.
TRANSISTORS			
Q12	2SB1240QR	001 030 7208 2	TRANSISTOR
Q13, Q14	2SD1862QR	001 030 7210 8	TRANSISTOR
Q15	2SD1862QR	001 030 7210 8	TRANSISTOR
Q16	2SB1240QR	001 030 7208 2	TRANSISTOR
Q19	2SB1238QS	001 030 7251 9	TRANSISTOR
Q101	2SC4010Q	001 030 7233 1	TRANSISTOR
Q141	2SD1862QR	001 030 7210 8	TRANSISTOR
Q142	2SB1240QR	001 030 7208 2	TRANSISTOR
Q161	2SD1862QR	001 030 7210 8	TRANSISTOR
Q162	2SB1240QR	001 030 7208 2	TRANSISTOR
Q181	2SD1862QR	001 030 7210 8	TRANSISTOR
Q182	2SB1240QR	001 030 7208 2	TRANSISTOR
Q401	2SD1862QR	001 030 7210 8	TRANSISTOR
Q402	2SB1240QR	001 030 7208 2	TRANSISTOR
Q403, Q404	UN4212	001 030 3019 1	TRANSISTOR
Q405, Q406	UN4212	001 030 3019 1	TRANSISTOR
Q407, Q408	UN4212	001 030 3019 1	TRANSISTOR

Ref. No.	Part No.	Part Code	Description
Q409, Q410	UN4212	001 030 3019 1	TRANSISTOR
Q411, Q851	UN4212	001 030 3019 1	TRANSISTOR
Q852	UN4111	001 030 2899 5	TRANSISTOR
Q853, Q854	2SD1330R	001 030 2521 6	TRANSISTOR
Q855	UN4212	001 030 3019 1	TRANSISTOR
Q856	UN4112	001 030 3018 2	TRANSISTOR
Q857, Q858	2SC3311-Q	001 030 2936 7	TRANSISTOR
Q859	UN4112	001 030 3018 2	TRANSISTOR
Q861	2SC3311-Q	001 030 2936 7	TRANSISTOR
Q862	2SA1309QRS	001 030 4058 0	TRANSISTOR
Q881, Q882	2SD1330R	001 030 2521 6	TRANSISTOR
DIODES			
D11, D12 ⚠	SVD1SR35200A	001 032 3951 4	RECTIFIER
D13, D14 ⚠	SVD1SR35200A	001 032 3951 4	RECTIFIER
D15, D16	SVD1SR35200A	001 032 3951 4	RECTIFIER
D17, D18	SVD1SR35200A	001 032 3951 4	RECTIFIER
D21	MA4056-M	001 032 7209 1	DIODE
D22	MA4200M	001 032 7554 7	DIODE
D23, D24	MA4068H	001 032 4952 9	DIODE
D25	MA4330M	001 032 4967 2	DIODE
D26	MA4068M	001 032 4954 7	DIODE
D181, D182	MA165	001 032 0494 0	DIODE
D401- D413	MA165	001 032 0494 0	DIODE
D415, D416	MA165	001 032 0494 0	DIODE
D417, D418	MA165	001 032 0494 0	DIODE
D420, D421	LN021404P	001 033 0044 7	LED ASS'Y
D601	MA153	001 032 0489 7	DIODE
D851, D852	MA165	001 032 0494 0	DIODE
D853, D856	MA165	001 032 0494 0	DIODE
D857	MA165	001 032 0494 0	DIODE
I.C.PROTECTORS			
ICP1, ICP2 ⚠ (EK, XB, XA) (PA, PE, PC)	SRUF38	001 061 2824 1	I.C.PROTECTOR
SJ11, SJ12 (EK)	SRUF15		I.C.PROTECTOR
HALL ELEMENTS			
H601, H602	0H-001	001 036 0010 2	HALL ELEMENT
VARIABLE RESISTORS			

Ref. No.	Part No.	Part Code	Description
VR101	EVND3AA00B53	001 180 2644 9	V.R., 5KΩ(B)
VR102, VR103	EVND3AA00B14	001 180 2642 1	V.R., 10KΩ(B)
VR104, VR105	EVND3AA00B14	001 180 2642 1	V.R., 10KΩ(B)
VR106	EVND3AA00B53	001 180 2644 9	V.R., 5KΩ(B)
VR501	EVN38CA00B13	001 180 0549 5	V.R., 1KΩ(B)
VR871	EVUN1A019A15	001 174 9033 8	V.R., 100KΩ(A)
COILS AND TRANSFORMERS			
L601	NL4532T100K2	001 211 3218 9	COIL
T1 ⚠ (M, MC)	SLTD5K027SC	001 202 8858 4	POWER TRANSFORMER
T1 ⚠ (E, EG, EB, EH) (EF, EI)	SLTD5K028SE	001 202 8859 3	POWER TRANSFORMER
T1 ⚠ (EK, XL)	SLTD5K029SG	001 202 8860 0	POWER TRANSFORMER
T1 ⚠ (XB, XA, PA) (PE, PC)	SLTD5K030SX	001 202 8861 9	POWER TRANSFORMER
OSCILLATORS			
X301	SVQ16CKSS	001 250 1471 7	16.9344MHZ
DISPLAYS			
FL401	SADD8	001 001 0507 5	DISPLAY
FUSES			
F1 ⚠ (E, EG, EB, EH) (EF, EI, EK) (XL)	XBA2C012TB0	002 380 1370 8	250V, T125mA
F1 ⚠ (XA, XB, PA) (PE, PC)	XBA2C025TB0	002 380 1458 1	250V, T250mA
SWITCHES			
S1 ⚠	ESB8249V	003 435 5877 0	POWER SWITCH
S2 ⚠ (XB, XA, PA) (PE, PC)	SSR187-1	003 430 2201 5	SW, VOLTAGE SELECT
S101	SSPD9	003 434 1060 4	SW, REST
S102	SRDSMLS-3	003 438 1168 3	SW, REST
S401- S406	SSGD6	003 437 1001 0	SW, OPERATION
S411- S426	EVQQS405K	003 435 2832 5	SW, PROGRAM

Ref. No.	Part No.	Part Code	Description
CABINET AND CHASSIS			
1	SKLD7	016 828 0328 4	INSULATOR
2	SBC666-5	016 702 6679 9	BUTTON, POWER
3	SUBD8-1	016 712 0360 7	ROD
4	SKCD40KZ	016 800 2876 5	TOP COVER
5	XTV3+8G	005 501 0913 8	SCREW
6	XTV3+8J	005 501 0901 2	SCREW
7	XTV3+8JFZ	005 501 0919 2	SCREW
8	SNE2129-1	005 500 7938 6	SCREW
9 (E)	SGPLP320-KE		CHASSIS
9 (EB, EH, EF) (EI)	SGPLP320-KEB		CHASSIS
9 (EG)	SGPLP320-KEG		CHASSIS
9 (EK)	SGPLP320-KEK		CHASSIS
9 (M)	SGPLP320-KM		CHASSIS
9 (MC)	SGPLP320-KMC		CHASSIS
9 (PA, PE, PC)	SGPLP320-KPA		CHASSIS
9 (XA)	SGPLP320-KXA		CHASSIS
9 (XB)	SGPLP320-KXB		CHASSIS
9 (XL)	SGPLP320-KXL		CHASSIS
10	SGYLP320-KM	016 840 7578 8	FRONT PANEL
11	SBCD4590ZK0B	016 702 6983 4	BUTTON, OPEN
12	SBCD4600ZK0B	016 702 6985 2	BUTTON, STOP
13	SBCD4580ZK0B	016 702 6981 6	BUTTON, PLAY
14	SBCD4620ZK0B	016 702 6991 4	BUTTON, MEMORY
15	SBCD4610ZK0C	016 702 6988 9	BUTTON, NUMERIC(UPPER)
16	SBCD4610ZK0D	016 702 6989 8	BUTTON, NUMERIC(LOWER)
17	SBN1161-2	016 700 1849 9	KNOB, HEADPHONES
18	XTV3+8G	005 501 0913 8	SCREW
19	SJFD4	003 410 7707 6	OUTPUT TERMINAL
20	SMND12	016 632 1878 3	HOLDER
21 ⚠ (XL)	SJSD16	003 400 7436 6	AC SOCKET
21 ⚠ (M, MC, E, EG) (EB, EH, EF) (EI, EK, XB) (XA, PA, PE) (PC)	SJS9236	003 403 4660 7	AC SOCKET
22	SRDJHLJ15401	003 400 6583 0	HEADPHONES JACK
23	SMND13-1	016 632 1881 8	BRACKET
24	XNS7	005 507 1202 8	NUT
25	SUSD82-1	016 726 0950 5	SPRING
26	LN021404P	001 033 0044 7	LED ASS'Y
27	EMCS0350Z	003 402 1227 7	CONNECTOR (CN103)
28	EMCS0550Z	003 402 1233 9	CONNECTOR (CN402)
29	EMCS0650Z	003 402 1235 7	CONNECTOR(CN11, 801)
30	EMCS0750Z	003 402 1238 4	CONNECTOR (CN401)
31	EMCS0552M	003 402 0112 1	CONNECTOR (CN102)
32	SRDJ001N14E	003 410 6157 8	SHORTING PIN (CN102)
33	SJSD1709	003 403 6503 1	CONNECTOR (CN101)
34	SJSD0705	003 403 7204 5	CONNECTOR (CN406)

Ref. No.	Part No.	Part Code	Description
35	SJSD0805	003 403 7205 4	CONNECTOR (CN407)
36	EMCS0650ZL	003 400 4108 1	CONNECTOR (CN871)
37	SHGD123	016 653 1181 2	CUSHION RUBBER
38	SHGD122	016 653 1185 8	CUSHION RUBBER
39	SHDD4	005 500 8051 2	SCREW
40	SUWD69	016 650 5365 5	BRACKET
LOADING MECHANICAL			
101	SGXD3080ZK0B	016 846 3767 1	ORNAMENT PLATE
102	SISLP320-KM	016 630 1812 1	TRAVERSE BASE
103	SD0D7-1	016 766 0190 7	TURNTABLE ASS'Y
104	SD0D8	005 512 0399 3	RING
105	XXE26D5	005 500 5095 2	SCREW
106	SRQA010N04	017 726 0412 8	SPRING
107	S0MD9A	016 743 0060 3	ROTOR
108	S0RD21E	001 211 3925 9	COIL
109	SUXD78	016 634 0156 4	SHAFT
110	S0AD32A	001 271 0705 5	OPTICAL PICKUP
111	EWSL09A00000	016 652 0786 8	HOLDER
112	EWS7G0A00Q53	001 230 2843 7	RESISTANCE UNIT
113	SHGD47	016 653 1070 8	SPACER
114	S0YD8E-1	016 713 0380 8	YOKE
115	S0YD9	016 634 0125 1	YOKE
116	SHRD23	016 652 0633 4	LOCK SHAFT
117	SNSD10	005 500 5675 8	SCREW
118	SNSD27	005 500 7981 3	SCREW
119	XTV3+8G	005 501 0913 8	SCREW
120	XTV2+4G	005 501 4806 4	SCREW
121	XTV3+12G	005 501 0844 4	SCREW
122	XQN17+A6	005 500 4900 2	SCREW
123	SHGD110	016 653 1174 1	CUSHION RUBBER
124	SUSD84	016 726 0942 5	SPRING
125	SUSD85	016 726 0941 6	SPRING
126	SFXGB20-01	005 500 0624 9	SCREW

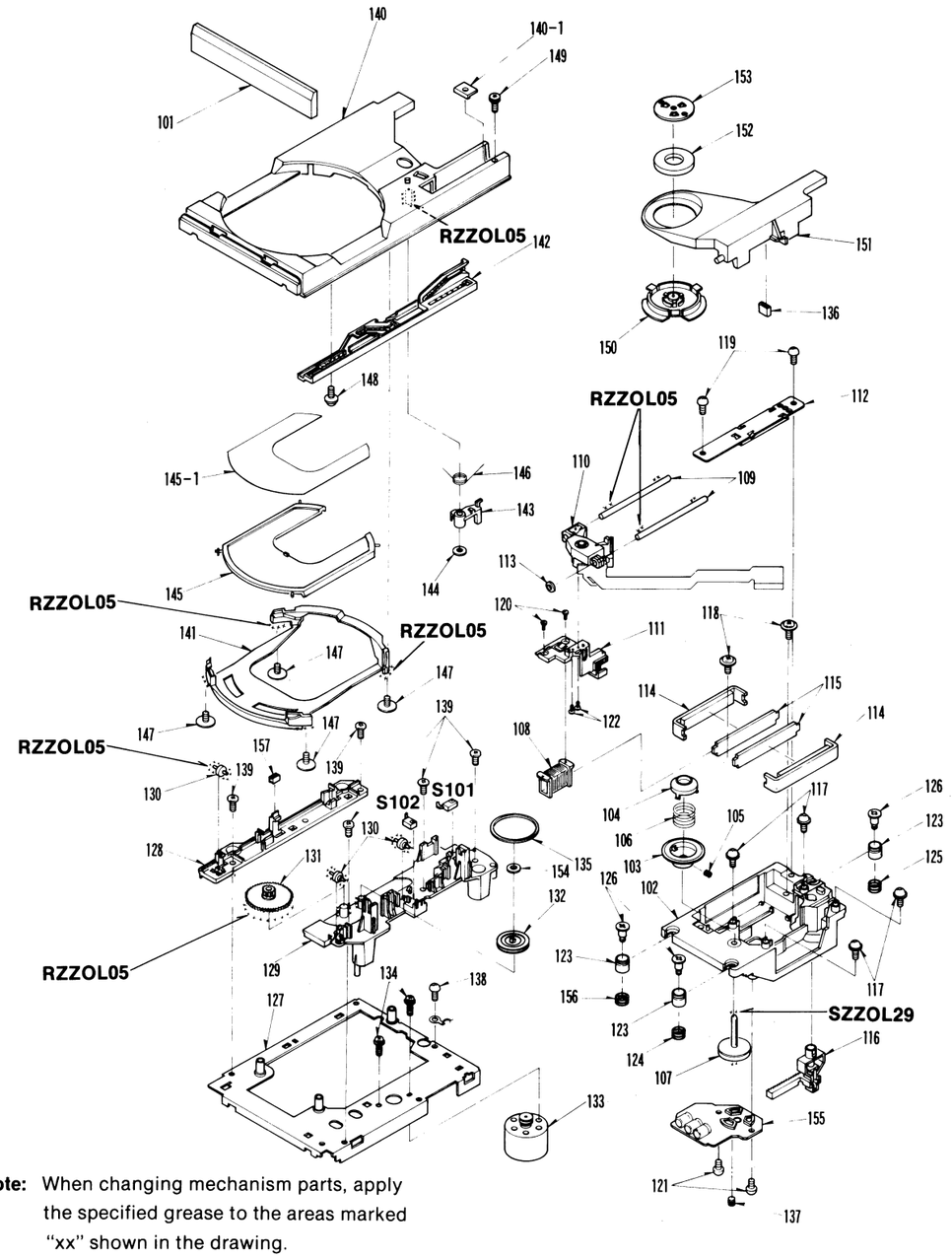
Ref. No.	Part No.	Part Code	Description
127	SIWLP320-KM	016 630 1813 0	LOADING BASE
128	SIRD43-1	016 652 0795 7	BRACKET, LOADING
129	SIRLP320KM3	016 652 0791 1	BRACKET, LOADING
130	SDRD2	016 740 0117 8	ROLLER
131	SDGD38	016 745 0231 2	MAIN GEAR
132	SDGD39-2	016 745 0234 9	PULLEY GEAR
133	SMNLP320-KM	002 310 2510 2	LOADING MOTOR
134	XYN26+T4	005 503 1310 5	SCREW
135	SMBD3	016 754 0063 9	DRIVE BELT
136	SHGD119	016 653 1175 0	CUSHION RUBBER
137	SNSD9	016 726 0765 4	SCREW
138	XTV3+6BFN	005 501 0888 2	SCREW
139	XTV3+8JFZ	005 501 0919 2	SCREW
140	SIRLP320KM2	016 652 0790 2	DISC TRAY
140-1	SHGD118	016 653 1179 6	CUSHION RUBBER
141	SIRD39	016 630 1809 6	BASE
142	SIRD40	016 630 1810 3	RACK GEAR
143	SIRD41	016 718 3379 4	LEVER
144	SFUMZ15R61	017 643 0111 8	WASHER
145	SIRLP320KM1	016 652 0792 0	DISC HOLDER
145-1	SHSD25	016 655 0657 1	SHEET
146	SUSD83	016 726 0943 4	SPRING
147	SFXGQ06N01	005 500 4983 3	SCREW
148	SFPEV17202	005 500 0589 5	SCREW
149	SNSD24	005 500 7982 2	SCREW
150	SIRD28	016 631 0053 5	HOLDER
151	SIRLP320KM4	016 652 0802 5	CLAMPER
152	S0MD4	003 453 0241 8	MAGNET
153	S0YD2	016 634 0111 7	YOKE
154	SHWD20	016 643 1043 7	WASHER
155	SXPD1440	003 483 3040 5	SPINDLE P.C.B.
156	SUSD90	016 726 0945 2	SPRING
157	SFGZB63M51	017 653 0144 3	CUSHION RUBBER

Ref. No.	Part No.	Part Code	Description
I.C. (REMOTE CONTROL)			
IC1001 (E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)	MN6030B	001 060 6133 0	I.C., TRANSMITTER
IC1001 (M, MC)	MN6030CA	001 060 8758 5	I.C., TRANSMITTER
TRANSISTORS (REMOTE CONTROL)			
Q1001	UN1231	001 030 5092 4	TRANSISTOR
DIODES (REMOTE CONTROL)			
D1001	LN66-S	001 032 3730 5	LED
D1002, D1003	MA154WA	001 032 3490 2	DIODE
D1004, D1005	MA154WA	001 032 3490 2	DIODE
D1006, D1007	MA154WA	001 032 3490 2	DIODE
OSCILLATOR (REMOTE CONTROL)			
X1001 (E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)	CSB420PB1	001 030 0013 9	420 KHZ
X1001 (M, MC)	CSB455EB1	001 241 0002 7	455KHZ
RESISTORS (REMOTE CONTROL)			
R1001	ERDS2TJ1R0	001 152 2419 4	CARBON, 1/4W, 1Ω
CAPACITORS (REMOTE CONTROL)			
C1001 (M, MC)	ECKD1H101KB	001 103 1412 0	CERAMIC, 50V, 100PF
C1001	ECKD1H471KB	001 103 1551 0	CERAMIC, 50V, 470PF

Ref. No.	Part No.	Part Code	Description
(E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)			
C1002 (M, MC)	ECKD1H101KB	001 103 1412 0	CERAMIC, 50V, 100PF
C1002 (E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)	ECKD1H121KB	001 103 1455 9	CERAMIC, 50V, 120PF
C1003	ECEA0JK101	001 120 0136 8	ELECTROLYTIC, 6.3V, 100μF
REMOTE CONTROL TRANSMITTER			
201	UR64CS119	016 640 0420 1	TOP COVER
202	UR64CS120	016 640 0419 4	BOTTOM COVER
203	UR64EC121	016 802 1716 4	COVER, BATTERY
204	UR64CT122	016 653 1011 9	RUBBER, SWITCH
205	UR64BT123A	016 702 6323 4	BUTTON
206	UR64PP398	016 840 7589 5	PANEL
207 (M, MC)	UR64LB406		LABEL
207 (E, EK, XL, EG) (EB, EH, EF) (EI, XA, XB) (PA, PE, PC)	UR64LB407		LABEL
208	UR64SB125	016 861 2468 6	PLATE
209	UR52TD101	003 413 1406 5	TERMINAL
210	UR64TD127	003 413 1407 4	TERMINAL (+)
211	UR64TD128	003 413 1408 3	TERMINAL (-)
212	XTS26+12GFZ	005 501 3122 9	SCREW

■ EXPLODED VIEWS

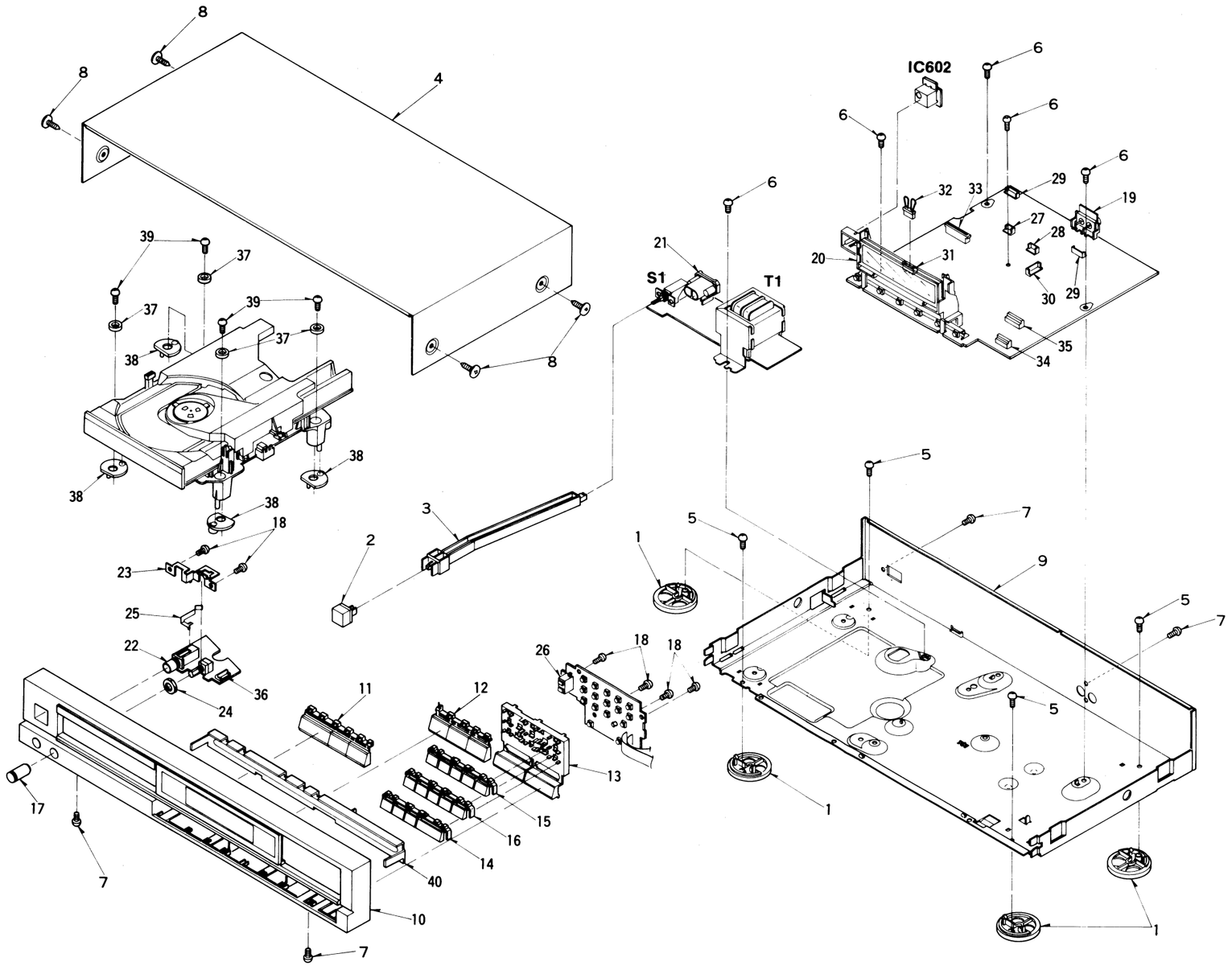
• Loading mechanical parts



Note: When changing mechanism parts, apply the specified grease to the areas marked "xx" shown in the drawing.

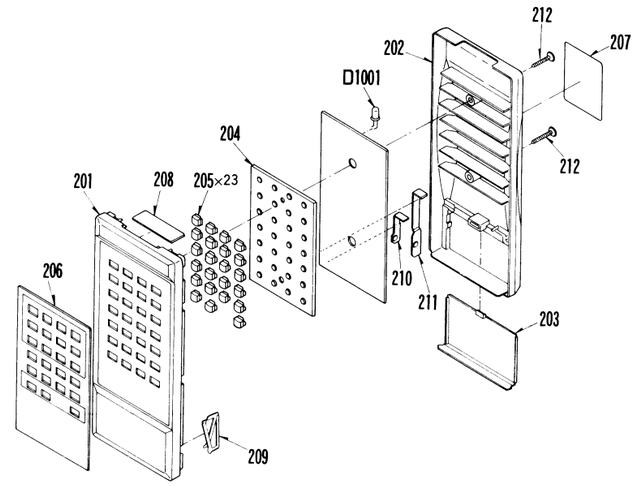
101~120	101 113 120 108 110 104 103 106 114 111 102 107 119 118 109 105 107 115 114 112 117 116
121~140	130 128 139 129 127 131 139 140 130 134 139 138 140-1 132 135 133 123 122 126 124 121 137 126 126 123 125
141~157	147 145 145-1 141 157 147 147 148 144 147 145 143 142 149 154 156 150 153 152 155 151

• Cabinet and chassis parts



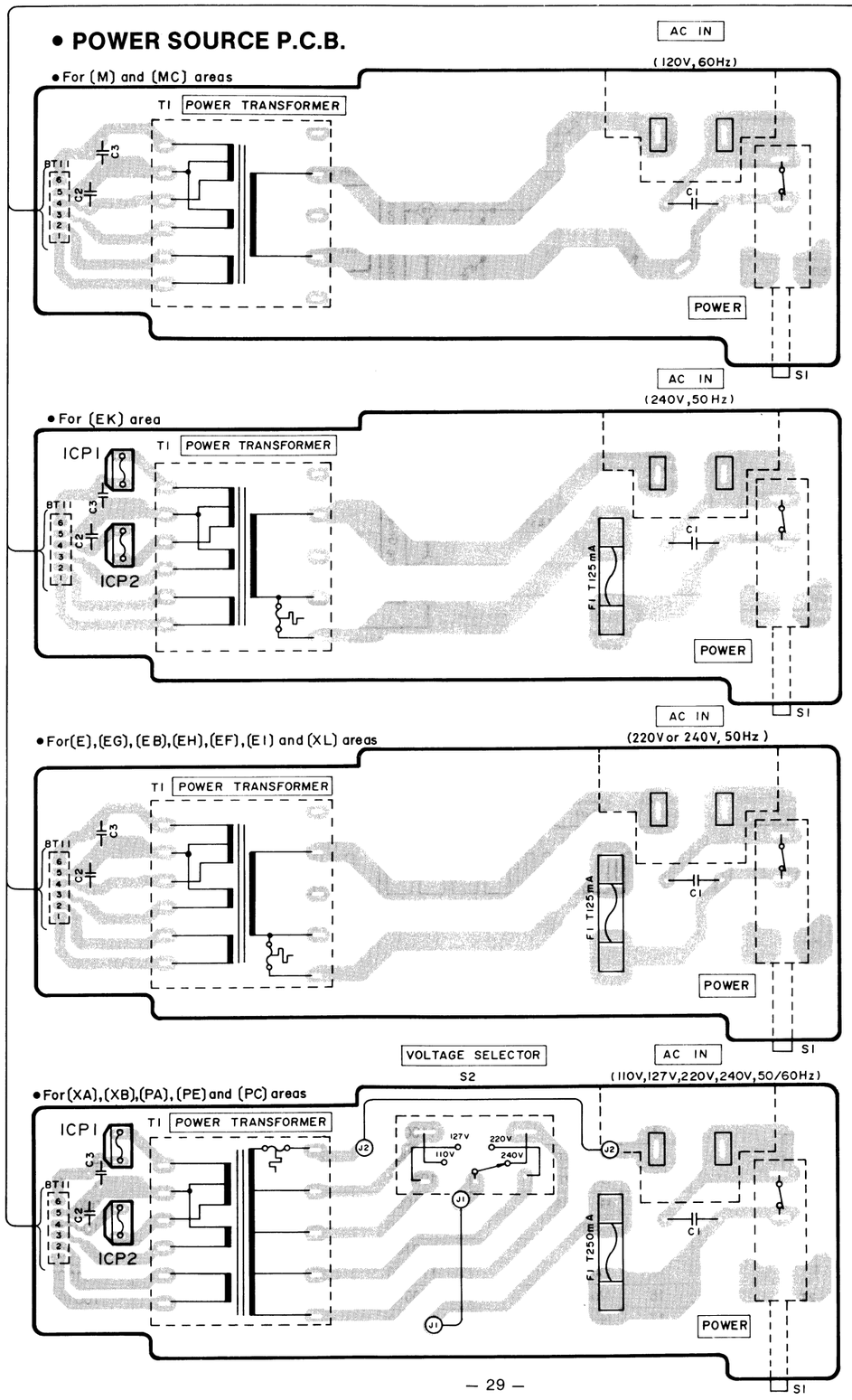
1~20	17 8 7 8 18 2 11 7 3 10 4 12 14 16 15 8 13 1 18 18 5 6 20 1 6 5 7 6 9 6 5 6 19 1 5 7
21~40	38 38 23 25 22 39 37 24 37 39 36 37 38 38 40 26 21 32 31 33 27 28 34 35 29 30 29

• Remote control unit parts

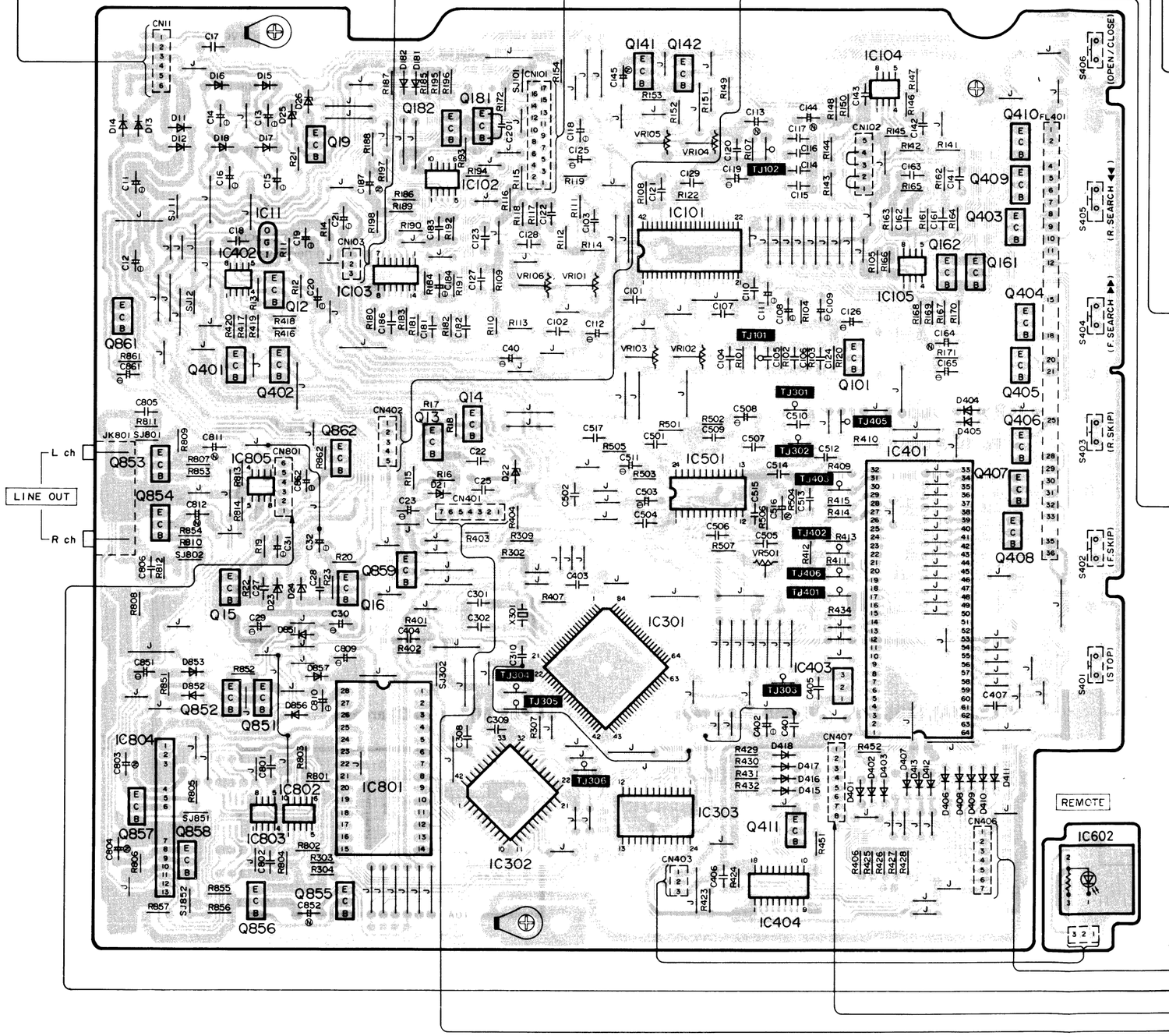


■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

• POWER SOURCE P.C.B.

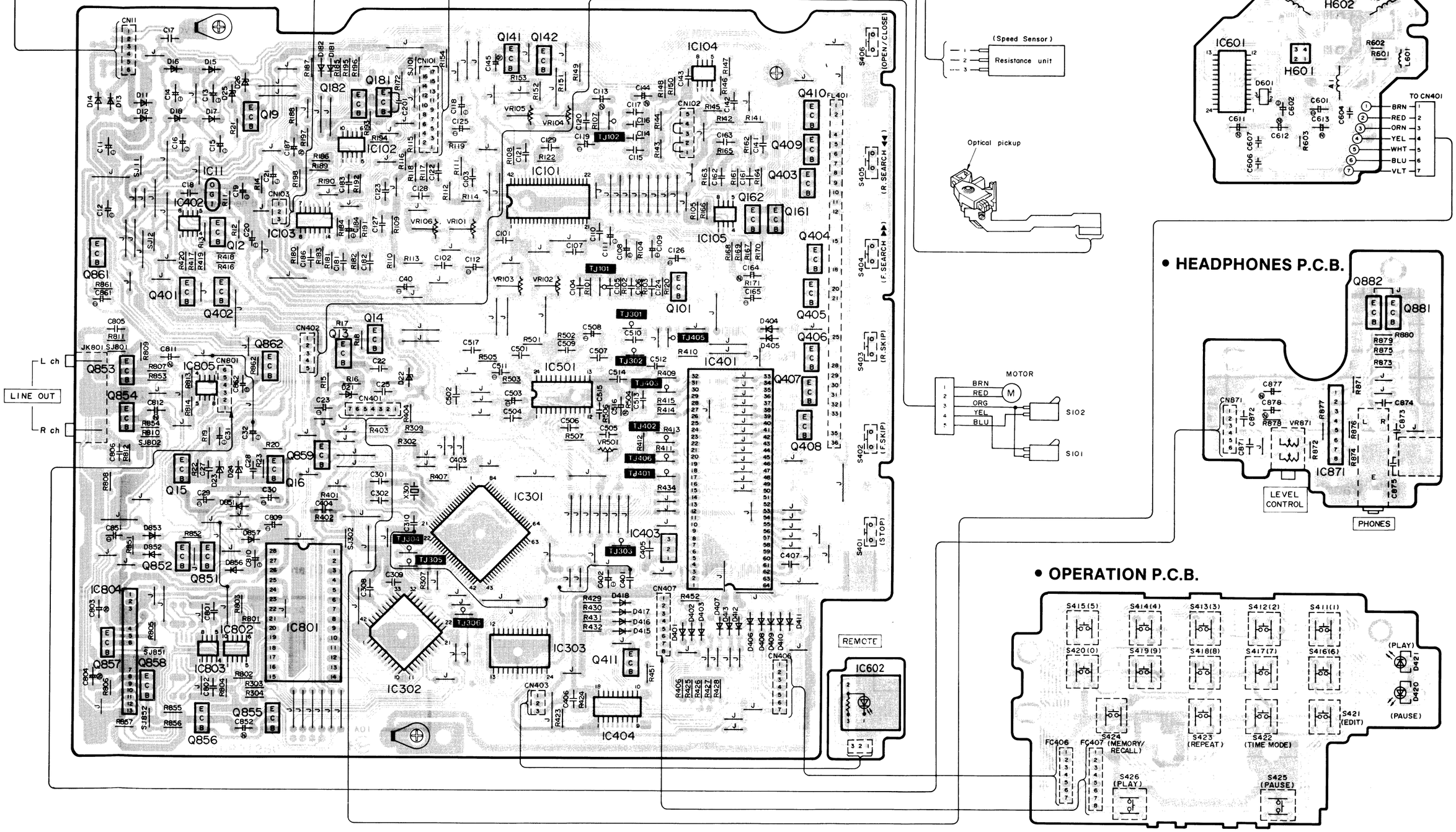


• MAIN P.C.B.

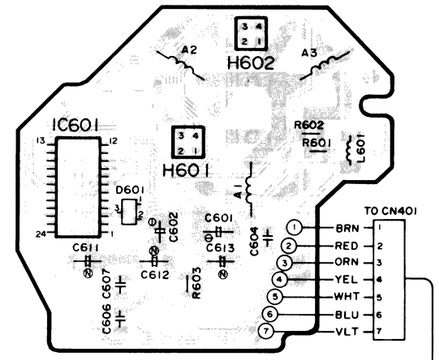


AM

• MAIN P.C.B.



• SPINDLE CONTROL P.C.B.

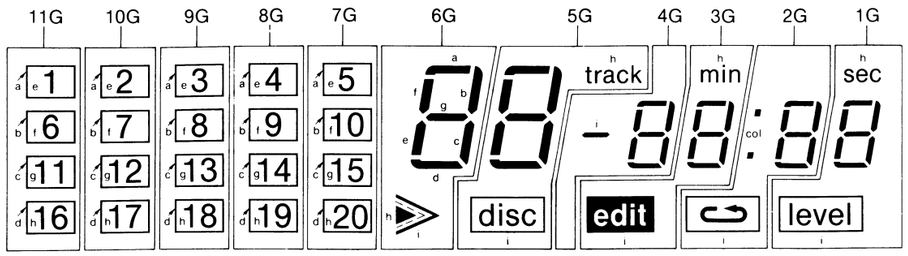


• HEADPHONES P.C.B.

• OPERATION P.C.B.

■ Internal connection of FL401

• Grid connection diagram

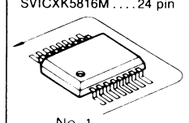


• Anode connection table

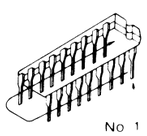
	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	1	2	3	4	5	a	a	a	a	a	a
b	6	7	8	9	10	b	b	b	b	b	b
c	11	12	13	14	15	c	c	c	c	c	c
d	16	17	18	19	20	d	d	d	d	d	d
e	1	2	3	4	5	e	e	e	e	e	e
f	6	7	8	9	10	f	f	f	f	f	f
g	11	12	13	14	15	g	g	g	g	g	g
h	16	17	18	19	20	▶	track	-	min	col	sec
i	-	-	-	-	-	>	disc	—	edit	⊂⊃	level

• Terminal guide of IC's, transistors and diodes

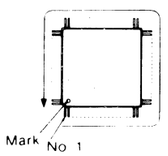
AN8370S .....42 pin
SVIL833M .....8 pin
SVINJM4560M .....8 pin
AN6552 .....8 pin
MN6636S .....10 pin
AN6554NS .....14 pin
MN1550PDT .....18 pin
AN8371S .....24 pin
SVICXK5816M ....24 pin



MN15261PDV .....64 pin
SVIPCM54HP-1 ...28 pin

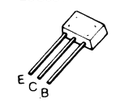


MN6617S .....84 pin
MN6618A .....42 pin

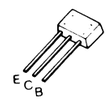


MN1280-R

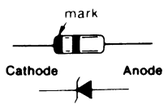
2SA1309
2SC3311



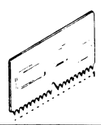
UN4111
UN4212



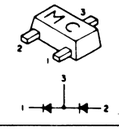
MA4068 MA4056
MA4200 MA4330

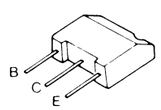


SVIHAF0238 ..... 12p



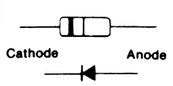
MA153



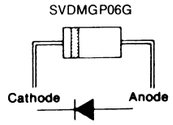


2SC4010
2SB1862
2SD1240
2SD1330

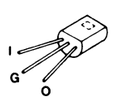
MA165



SVDMGP06G



SVILM2931Z



■ SCHEMATIC DIAGRAM

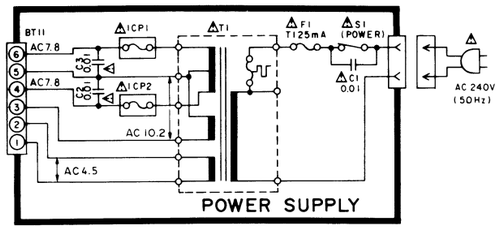
(This schematic diagram may be modified at any time with the development of new technology.)

* **Caution!**
IC and LSI are aensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.
* Cover the parts boxes made of plastics with aluminum foil.
* Ground the soldering iron.
* Put a conductive mat on the work table.
* Do not touch the legs of IC or LSI with the fingers directly.

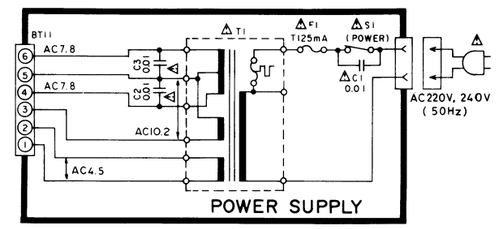
Notes:
1. **S1** : Power switch in "**on**" position.
2. **S2** : Voltage selector switch. (For [XA], [XB], [PA], [PE] and [PC] areas)
3. **S101** : Disc holder open/close detection switch.
4. **S102** : Disc holder open/close detection switch.
5. **S401** : Stop/clear switch.
6. **S402** : Forward skip switch.
7. **S403** : Backward skip switch.
8. **S404** : Forward search switch.
9. **S405** : Backward search switch.
10. **S406** : Open/close switch.
11. **S411~420** : Numeric (0~9) switch.
12. **S421** : Preset editing switch.
13. **S422** : Time mode select switch.
14. **S423** : Repeat switch.
15. **S424** : Memory/recall switch.
16. **S425** : Pause switch.
17. **S426** : Play switch.
18. The voltage value and waveform are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
    * The parenthesized are the values of voltage generated during playing (Test disc 1kHz, L+R, 0dB), others are voltage values in stop mode.
19. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
20. ——— : Positive voltage lines and negative voltage lines.
    ⋯⋯ : Audio signal lines.

• Power supply circuit

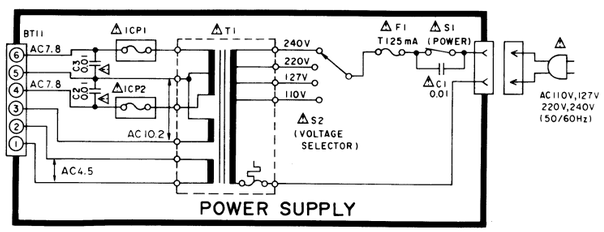
• For [EK] area



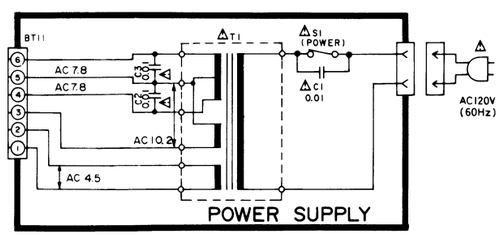
• For [E], [EG], [EB], [EH], [EF], [Ei] and [XL] areas



• For [XA], [XB], [PA], [PE] and [PC] areas



• For [M] and [MC] areas



A
B
C
D
E
F

• Remo

Key No.
0
2
3
4
5
6
7
10
11
16
17
18
19
20
21
22
23
24
25
36
37
41
42

• Key n

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

* **Caution!**
IC and LSI are aensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

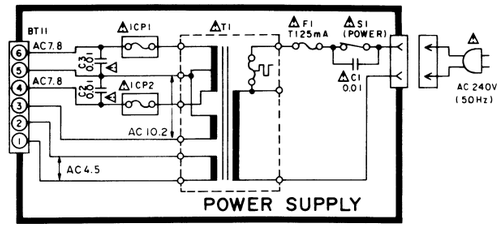
* Cover the parts boxes made of plastics with aluminum foil.
* Ground the soldering iron.
* Put a conductive mat on the work table.
* Do not touch the legs of IC or LSI with the fingers directly.

Notes:

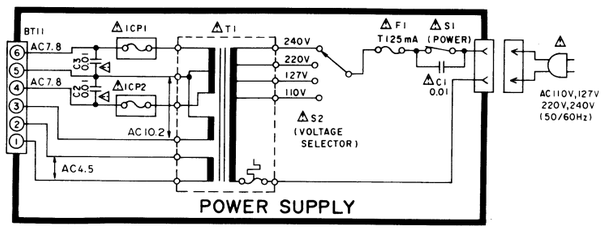
1. **S1** : Power switch in "**on**" position.
2. **S2** : Voltage selector switch. (For [XA], [XB], [PA], [PE] and [PC] areas)
3. **S101** : Disc holder open/close detection switch.
4. **S102** : Disc holder open/close detection switch.
5. **S401** : Stop/clear switch.
6. **S402** : Forward skip switch.
7. **S403** : Backward skip switch.
8. **S404** : Forward search switch.
9. **S405** : Backward search switch.
10. **S406** : Open/close switch.
11. **S411~420** : Numeric (0~9) switch.
12. **S421** : Preset editing switch.
13. **S422** : Time mode select switch.
14. **S423** : Repeat switch.
15. **S424** : Memory/recall switch.
16. **S425** : Pause switch.
17. **S426** : Play switch.
18. The voltage value and waveform are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
    * The parenthesized are the values of voltage generated during playing (Test disc 1kHz, L+R, 0dB), others are voltage values in stop mode.
19. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
20. ——— : Positive voltage lines and negative voltage lines.
    ⋯⋯ : Audio signal lines.

• Power supply circuit

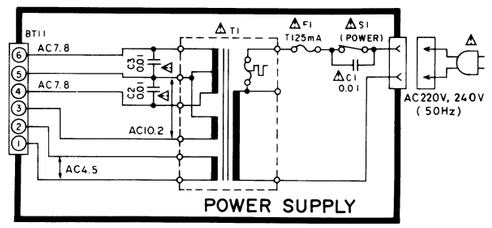
• For [EK] area



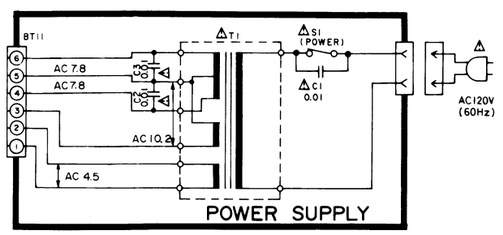
• For [XA], [XB], [PA], [PE] and [PC] areas



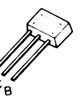
• For [E], [EG], [EB], [EH], [EF], [Ei] and [XL] areas



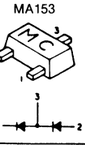
• For [M] and [MC] areas



UN4111
UN4212

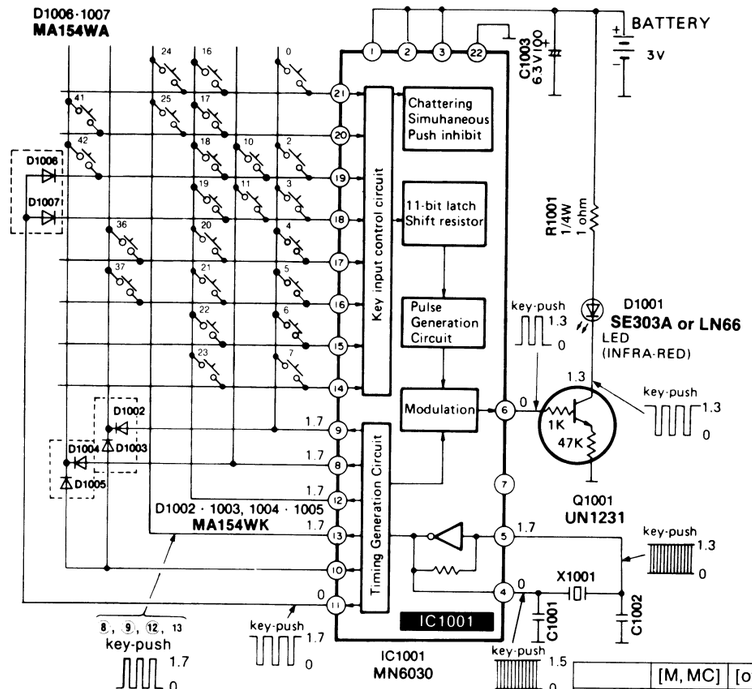


MA153



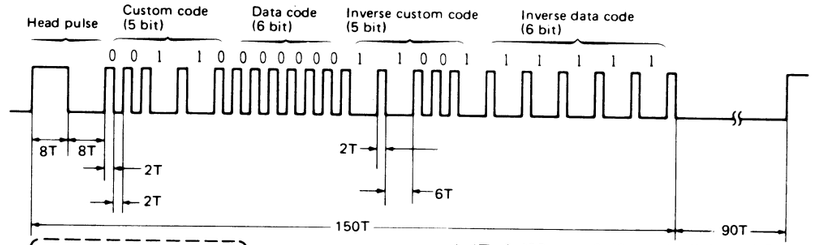
• Remote control unit

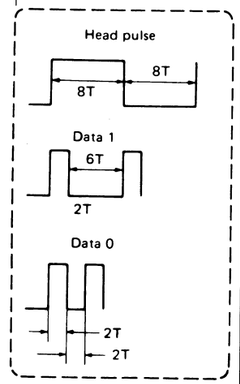
Key No.	Function
0	Stop
2	Skip ⏮
3	Skip ⏭
4	◀◀ Search
5	Search ▶▶
6	⏸ Pause
7	Repeat
10	Play/pause
11	Clear
16	Numeric 1
17	Numeric 2
18	Numeric 3
19	Numeric 4
20	Numeric 5
21	Numeric 6
22	Numeric 7
23	Numeric 8
24	Numeric 9
25	Numeric 0
36	Level Up ▲
37	Level Down ▼
41	Time mode
42	Memory/recall



	[M, MC]	[others]
C1001	100P	470P
C1002	100P	120P

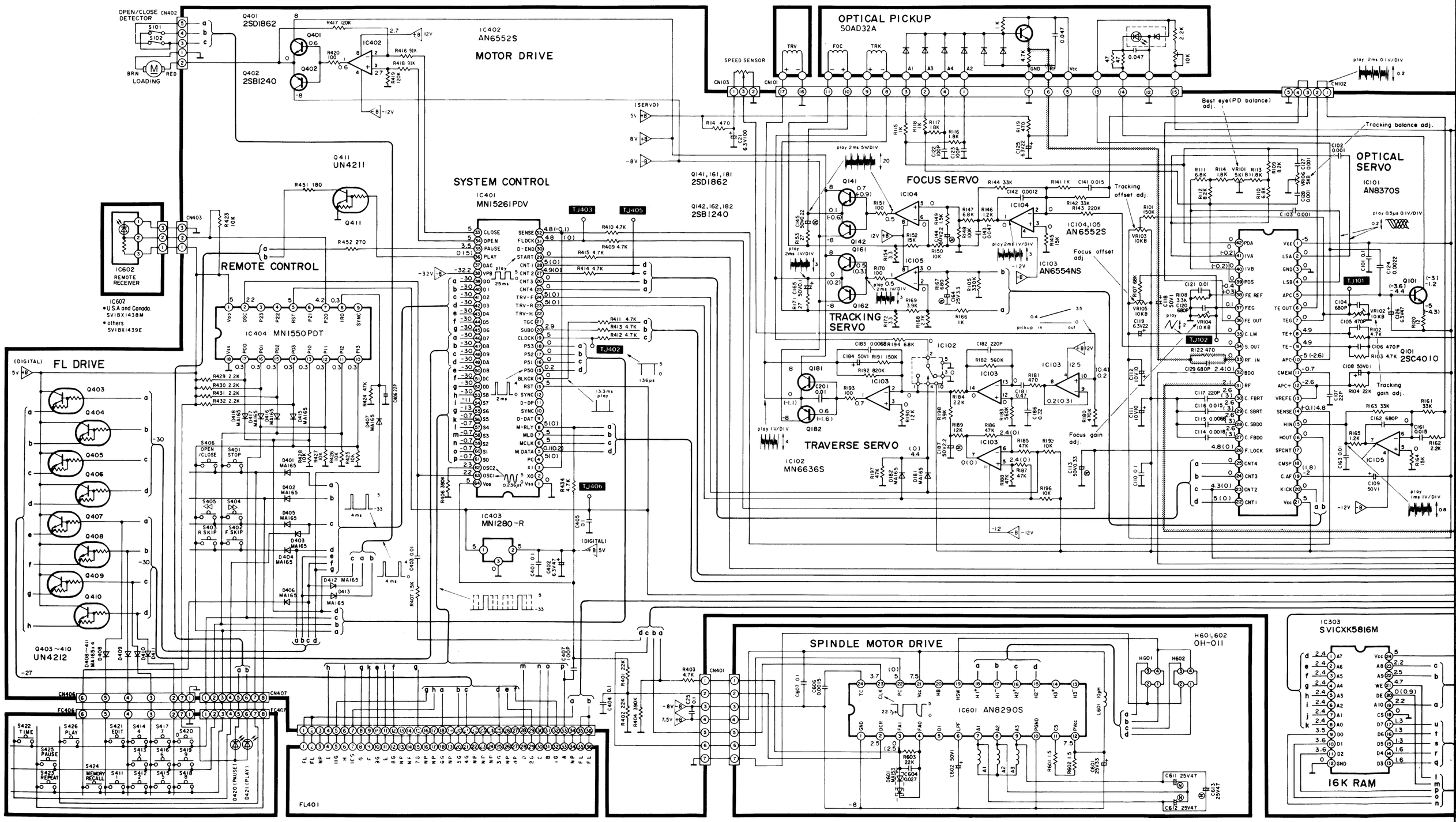
• Key number description and data code

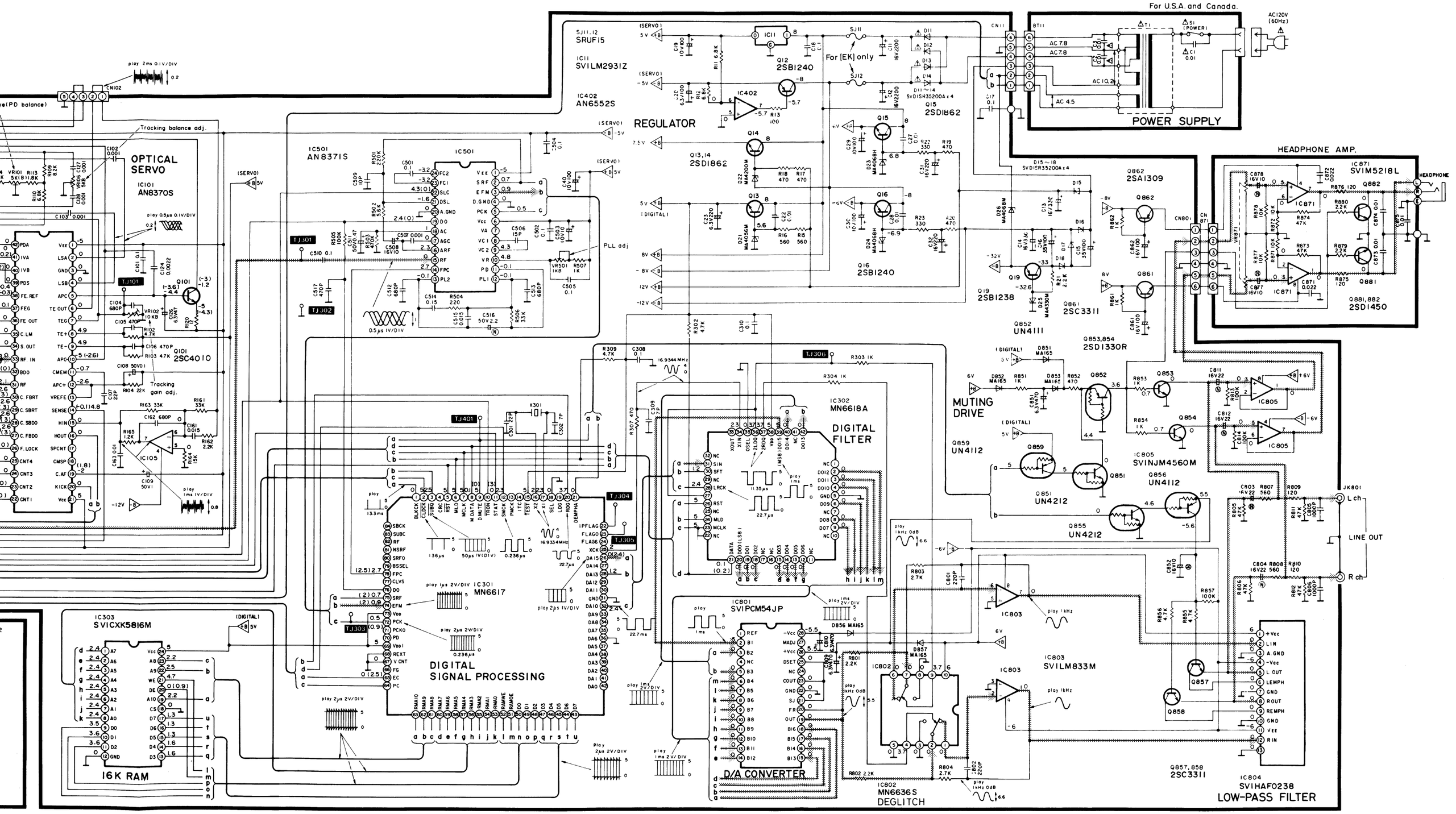




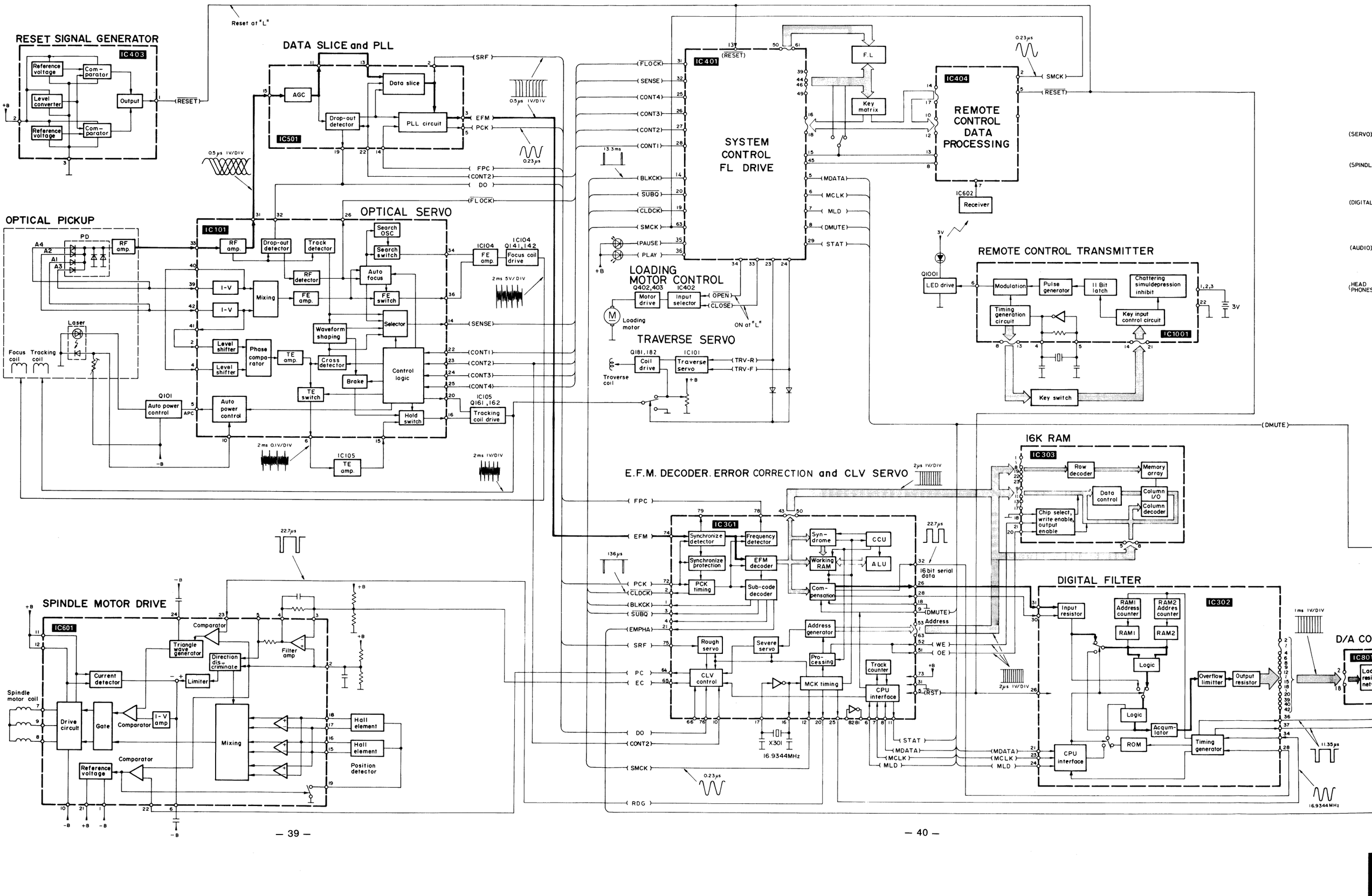
★ 1T=0.420ms ~ 0.424ms (U.S.A. and Canada)
1T=0.454ms ~ 0.460ms (Europe and others)

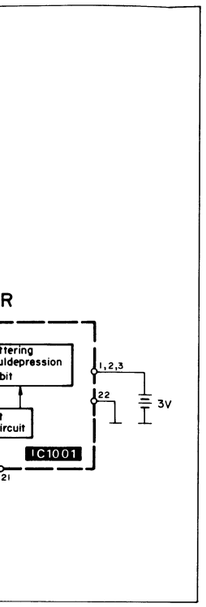
Key No.	Function	Data Code	Key No.	Function	Data Code
0	Stop	000000	19	Numeric 4	110010
2	Skip ⏮	010000	20	Numeric 5	001010
3	Skip ⏭	110000	21	Numeric 6	101010
4	◀◀ Search	001000	22	Numeric 7	011010
5	Search ▶▶	101000	23	Numeric 8	111010
6	⏸ Pause	011000	24	Numeric 9	000110
7	Repeat	111000	25	Numeric 0	100110
10	Play	010100	36	Level Up ▲	001001
11	Clear	110100	37	Level Down ▼	101001
16	Numeric 1	000010	41	Time Mode	100101
17	Numeric 2	100010	42	Memory/recall	010101
18	Numeric 3	010010			

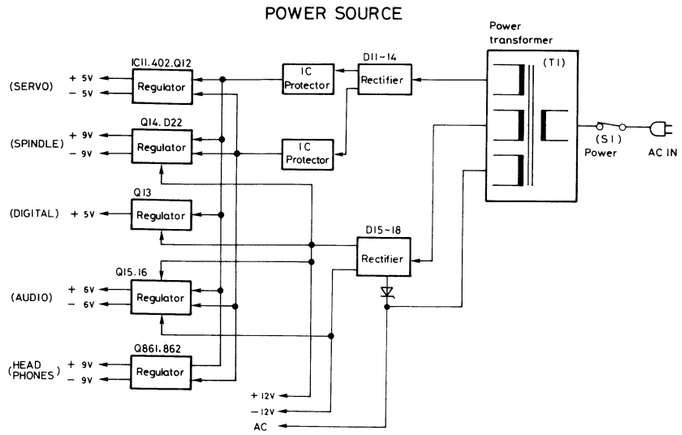

OPTICAL PICKUP
SOAD32A
OPTICAL SERVO
IC101 AN8370S
FOCUS SERVO
TRACKING SERVO
TRAVERSE SERVO
IC102 MN6636S
SYSTEM CONTROL
IC401 MN15261PDV
REMOTE CONTROL
IC404 MN1550PDT
IC602 REMOTE RECEIVER
IC602 • U.S.A and Canada. SVIBX1438M • others SVIBX1439E
MOTOR DRIVE
IC402 AN6552S
IC403 MN1280-R
IC104,105 AN6552S
IC103 AN6554NS
FL DRIVE
Q403~410 UN4212
Q411 UN4211
Q401 2SD1862
Q402 2SB1240
Q141,161,181 2SD1862
Q142,162,182 2SB1240
SPINDLE MOTOR DRIVE
IC601 AN8290S
H601,602 0H-011
IC303 SVICXK5816M
16K RAM
FL401
OPEN/CLOSE DETECTOR
LOADING
SPEED SENSOR
Best eye(PD balance) adj.
Tracking balance adj.
Tracking offset adj.
Focus offset adj.
Focus gain adj.
Tracking gain adj.
Q101 2SC4010
Q101 (-3) -1.2
(-3.6) 4.4
-5 (-4.3)
-5 (-2.6)

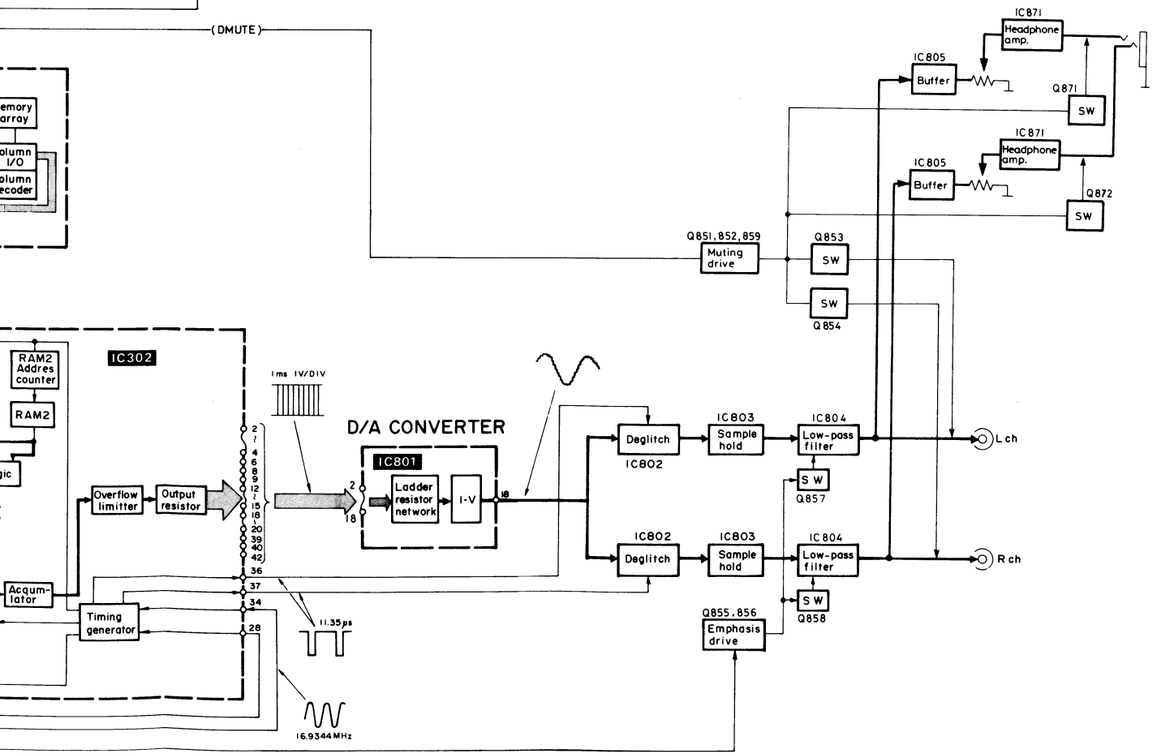

OPTICAL SERVO
IC101 AN8370S
REGULATOR
IC501 AN8371S
DIGITAL SIGNAL PROCESSING
IC301 MN6617
IC303 SVICXK5816M
16K RAM
IC302 MN6618A
DIGITAL FILTER
IC801 SVIPCM54JP
D/A CONVERTER
IC802 MN6636S
DEGLITCH
IC803 SVILM833M
IC804 SVIHAF0238
LOW-PASS FILTER
MUTING DRIVE
IC805 SVINJM4560M
POWER SUPPLY
For U.S.A. and Canada.
HEADPHONE AMP.
IC871 SVIM5218L
Q101 2SC4010
Q16 2SB1240
Q15 2SD1862
Q13,14 2SD1862
Q19 2SB1238
Q852 UN4111
Q853,854 2SD1330R
Q861 2SC3311
Q862 2SA1309
Q881,882 2SD1450
Q856 UN4112
Q855 UN4212
Q851 UN4212
Q859 UN4112
Q857,858 2SC3311
IC402 AN6552S
IC111 SVILM2931Z
SJ11,12 SRUF15
For [EK] only
PLL adj
Tracking balance adj.
Tracking gain adj.
LINE OUT
L ch
R ch

■ BLOCK DIAGRAM

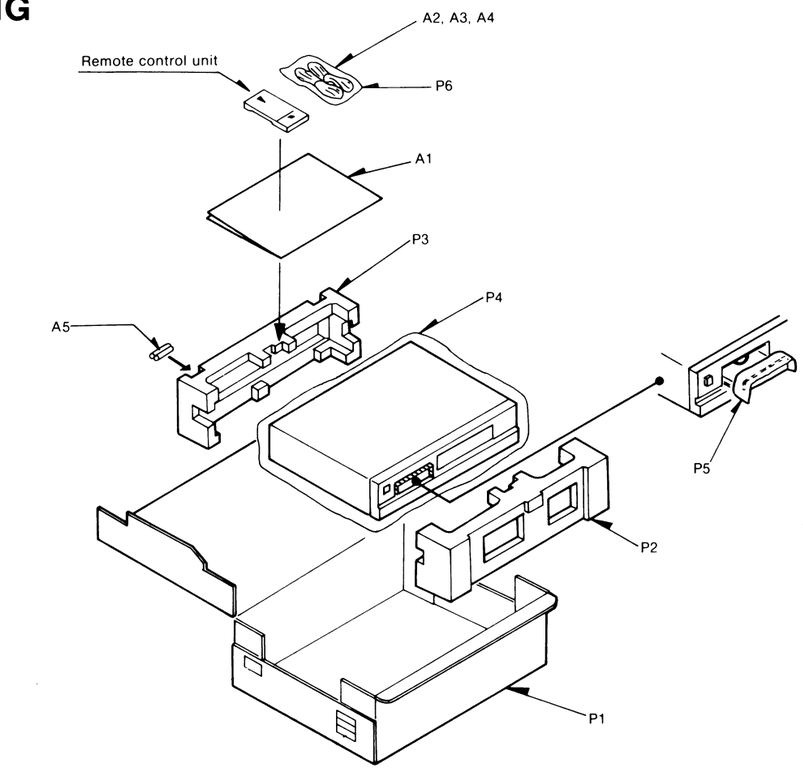








■ PACKING



■ REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Code	Description
PACKINGS			
P1 (M, E, EG, EB) (EH, E1, EK) (XL, XA, XB) (PA, PE, PC)	SPND202	016 971 4989 5	CARTON BOX
P1 (MC)	SPND203	016 971 4987 7	CARTON BOX
P1 (EF)	SPND204	016 971 4988 6	CARTON BOX
P2	SPSD110	016 977 3277 4	PAD
P3	SPSD111	016 977 3278 3	PAD
P4	XZB55X40A01	016 978 0472 0	PROTECTION BAG
P5	SPSD68	016 977 3081 4	SHEET
P6	XZB26X17C03	016 978 0526 3	POLYETHYLENE BAG
ACCESSORIES			
A1 (M)	SQUD210	016 983 5093 6	INSTRUCTION MANUAL
A1 (XL, XA)	SQUD212	016 983 5092 7	INSTRUCTION MANUAL
A1 (EG)	SQUD214	016 983 5091 8	INSTRUCTION MANUAL
A1 (EF)	SQUD215	016 983 5090 9	INSTRUCTION MANUAL
A1 (E1)	SQUD216	016 983 5089 2	INSTRUCTION MANUAL
A1 (EK)	SQUD217	016 983 5087 4	INSTRUCTION MANUAL
A1 (E, EB, EH)	SQULP320-KE	016 983 5084 7	INSTRUCTION MANUAL
A1 (MC)	SQULP320-KMC	016 983 5085 6	INSTRUCTION MANUAL
A1 (PA, PE, PC)	SQULP320-KPA	016 983 5083 8	INSTRUCTION MANUAL
A1 (XB)	SQULP320-KXB	016 983 5086 5	INSTRUCTION MANUAL
A2 ⚠ (EK)	SFDAC05G02	003 490 2613 3	POWER CORD
A2 ⚠ (XA, PA, PE)	SJA168	003 490 4122 9	POWER CORD
A2 ⚠ (PC)	SJA170	003 490 4064 2	POWER CORD
A2 ⚠ (MC)	SJA170-1	003 490 5022 8	POWER CORD
A2 ⚠ (M)	SJA171	003 490 4160 3	POWER CORD
A2 ⚠ (E, EG, EB, EH) (EF, E1)	SJA173	003 490 4161 2	POWER CORD
A2 ⚠ (XL)	SJA183	003 490 4873 7	POWER CORD
A2 ⚠ (XB)			
A3 ⚠ (XB, XA, PA) (PE, PC)	RJP120ZBS-H	003 402 1437 9	ADAPTOR
A4	SJP2249-1	003 492 6446 4	OUTPUT CORD
A5 (E, EG, EB) (EH, EF, E1) (EK, XL, XB) (XA, PA, PE) (PC)	UM-3NE		BATTERY
A5 (M, MC)	UM-3NEP		BATTERY

Printed in Japan
870212000ⓈJN/HS
870324000ⓈJN/HS